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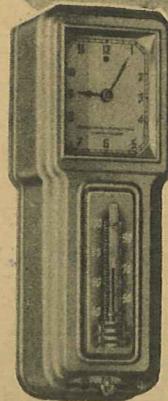
MINNEAPOLIS - HONEYWELL

Automatic Controls and Control Systems

BROWN INSTRUMENTS for
Indicating, Recording and Controlling

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The Chronotherm
Provides absolutely
unvarying tempera-
ture and prevents
"Cold 70°" . . .

*P*hronotherm

can provide **AUTOMATIC NIGHT TEMPERATURE
AND LEVELED HEAT ECONOMY**



The Minneapolis-Honeywell Chronotherm is the *only* thermostat that automatically provides the economy resulting from both lowered night temperature and leveled heat. With Chronotherm control, temperatures are automatically reduced, without manual attention at any time. Overheating is entirely eliminated. Your customers will quickly see the advantages of the Chronotherm with its electric clock control over any other thermostat. The satisfaction the Chronotherm produces makes it advantageous for you to recommend it . . . Minneapolis Honeywell Regulator Company.

MINNEAPOLIS-HONEYWELL
Control Systems
BROWN INSTRUMENTS FOR INDICATING RECORDING AND CONTROLLING

MINNEAPOLIS - HONEYWELL

Controls & Control Systems

BROWN INSTRUMENTS for *Indicating, Recording, Controlling*

MINNEAPOLIS-HONEYWELL REGULATOR CO.

General Offices and Main Plant MINNEAPOLIS, MINNESOTA

Cable Address MINNREG, MINNEAPOLIS

Research Division and Plant WABASH, INDIANA

BROWN INSTRUMENT COMPANY

Division of Minneapolis-Honeywell Regulator Co.

General Offices and Main Plant PHILADELPHIA, PENNSYLVANIA

Cable Address BROWNSON, PHILADELPHIA

NATIONAL REGULATOR DIVISION

of the Minneapolis-Honeywell Regulator Company

Manufacturing Plant CHICAGO, ILLINOIS

Sales MINNEAPOLIS-HONEYWELL REGULATOR CO., MINNEAPOLIS, MINN.

and BRANCH OFFICES.

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STOCKS of all the Minneapolis-Honeywell controls are constantly carried at our branch and distributing offices, in order that we may most quickly fill your needs. A telephone call will bring prompt delivery. Due to highly specialized requirements for Brown Instruments, they cannot be carried in branch stocks. However, your orders, placed with these offices, will be promptly filled and shipped from the Brown Plant.



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Effective

Information in this catalog effective June 1, 1937.
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MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Control Circuit Information

In General

The first number in the type number of an instrument designates the electrical control circuit to which the instrument is applicable. The various control circuits in common use are named Series 10, Series 20, Series 30, Series 40, Series 60 and Series 60 floating and Series 90 respectively.

Series 10

refers to the control circuit in which two contacts are made in sequence to start, and break in reverse sequence to stop. This circuit is particularly adaptable to relay operation. The thermostat and controller wiring is three-wire, low voltage.

" 20

refers to the control circuit in which one circuit is made when the controller calls for heat and another circuit is made when the controller is satisfied. A Series 20 device does not return to the "off" position on power failure. This circuit is particularly adaptable to motor operation. The thermostat and controller wiring is three-wire, low voltage, but is entirely different from Series 10.

" 30

refers to the control circuit in which one circuit is made for starting and another circuit is made for stopping. A Series 30 device returns to the "off" position on power failure. This circuit is particularly adaptable to relay operation. The thermostat and controller wiring is three-wire, low voltage, and is the same as Series 20.

" 40

identifies devices to be used in two-wire line voltage circuits, for use in special applications and for direct control.

" 50

refers to devices that are non-electrical.

" 60

refers to the control circuit in which one contact is made for starting line voltage controlled equipment and another contact is made for stopping line voltage controlled equipment. In other words, Series 60 is the line voltage equivalent of Series 20.

Floating Control typifies the circuit wherein a reversing motor will move in the direction determined by the thermostat or controller, as long as the contacts are made, and will be reversed as the contacts in the thermostat are reversed; with a stand-by occurring when the contacts in the thermostat or controller are broken.

" 80

refers to devices having a two-wire low voltage control circuit. In other words, Series 80 is the low voltage equivalent of Series 40.

" 90

applies to modulating or proportioning equipment which provides for modulation of the device under control in proportion to the demands of the thermostat or controller. This is accomplished through the use of potentiometer type instruments.

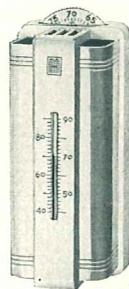


Room Thermostats

ROOM THERMOSTATS—FOR HEATING OR COOLING CONTROL

Most Minneapolis-Honeywell Thermostats are available for cooling control as well as heating control. Series 10 thermostats for cooling service must be specially manufactured with reverse acting temperature sensitive elements and cannot be used for both heating and cooling control. Series 20, 60 and 90 thermostats are built and color coded as heating controls but can be used as cooling thermostats by merely interchanging

the blue and white wires attached to the terminals. These groups of thermostats can be used for both heating and cooling by installing a manual double pole double throw switch which when changed from one position to the other will reverse the wiring. This changeover may also be made automatically by use of suitable relays and controllers. Series 40 thermostats for cooling must be ordered reverse acting.



ACRATHERM

The Acratherm combines accuracy of control with dignity in tone and simplicity of design. In performance and appearance it answers the demand of the heating industry in every detail. Two models of the Acratherm are available, the T10 which is the standard "Series 10" device, and the T11 which also incorporates the "Series 10" circuit and in addition has the Heat Acceleration feature. The heater arrangement of the T11 is such that it can be quickly changed to the T10 by simply removing three parts.

The T11 Acratherm, incorporating the exclusive feature of Heat Acceleration, may be considered as a conventional Series 10 Thermostat to which has been added a medium for producing artificial heat. The artificial heat is not applied until there has been a sufficient rise in room temperature to open the blue contact—and the time elapsing is directly dependent on the extent of the variables present at each burner operation. These variables, the results of which influence heat losses, are outside temperature, wind direction and wind velocity, solar radiation, leaky windows, poorly insulated walls, ceiling and floors, and undersized and oversized heating plants. The Acratherm controls the results of these variables without the necessity of manually raising or lowering the indicator setting as conditions change. The correctness of the Heat Acceleration principle has been positively proven by field and laboratory tests.

By employing the use of auxiliary heat to accelerate the opening of the white contact, temperature overshooting is eliminated and the more frequent firing intervals prevent "Cold 70°" and undershooting. While the T11 Acratherm permits shorter firing periods than conventional thermostats, yet longer operations can be obtained by a simple adjustment.

When ordering the T11 always specify type of controls being used, together with voltage and frequency—

Specify T11A10 for use with R116, R117, R118, R125, and R126 Protectorelays for 110 and 220 volt 40-60 cycle applications. For 25-30 cycle applications of above Protectorelays specify T11A42.

Specify T11A42 for use with R121, R122, R123, R124 and R19 Relays for 110 and 220 volt 60 cycle applications. For 25 cycle applications of above Protectorelays specify T11A66.

Specify T11A10 for use with R103-5, R109, R105, U-10-D, R113, and R100-2 Protectorelays for 110 and 220 volt, 25 to 30 and 50 to 60 cycle applications.

Specify T11A73 for use with R114-2 Protectorelay for 110 or 220 volt, 50 or 60 cycle applications.

Specify T11A30 for use with R10, R12, R14, R15, R18, R150, R152, R153, R154, R155 and R156 Relays for 110 or 220 volt, 50 or 60 cycle applications. For 110 or 220 volt, 25 to 30 cycle applications for the above relays specify T11A42.

Specify T11A1 for use with V15 Gas Valve for 110 or 220 volt, 25 to 60 cycle applications.

Specify T11A58 for use with V16 Gas Valve and with V117, V118, and V119 Diaphragm Gas Valves for 110 or 220 volt, 50 to 60 cycle applications.

Specify T11AX55 for use with F2210 Gas Valves for 110 or 220 volt, 50 or 60 cycle applications.

T11 not available for use with R101 and R112 Protectorelays or for any D.C. equipment.

TYPES T20 AND T21 THERMOSTATS

The T20 is the standard Series 20 device; the T21 incorporates the heat leveling feature with the standard Series 20 device. The heater arrangement of the T21 is such that it can be quickly changed to the T20 by simply removing three parts.

When ordering T21 always specify controls being used, together with voltage and frequency—

Specify T21A1 using element coded Yellow and Red for use with M26, M27, D, DS and DS-3 Motors and V24, V25, V205 and V208 Valves for 110 or 220 volts, 25 or 60 cycle.

Specify T21A14 using element coded Red and White for use with R30, R32, R33, R34, R35, R39 Relays and the L30 Air Conditioning Furnacestat for 110 or 220 volts, 25 to 60 cycle.

Specify T21A21 using element coded Black and Brown for use with V36, V316, V317, V318 and V319 Valves for 110 or 220 volts, 25 to 60 cycle.

GENERAL SPECIFICATIONS

Scale Range: 55 to 85° F. Silver Finish.

Locking device available at no extra charge.

Available with equivalent Centigrade scale at no extra charge.

T21 not available for cooling control.

TIME-O-STAT

The Time-O-Stat provides, by a simple twist of the wrist, an inexpensive means of maintaining a lowered control temperature either day or night. It can, therefore, be used to maintain the lowered control temperature both during the night, and during the occupant's absence during the day, as a simple resetting is required for each operation. Maintaining lower temperatures during the night and during the occupant's absence during the day will enable the occupant to effect very material fuel savings.

The Time-O-Stat is an extremely flexible yet remarkably simple device. A simplified adjustment makes it easy to control at the lowered temperature for any length of time up to 10 hours. The setting can be made at any point to as low as 45° F. by merely setting indicator to the desired lowered temperature. Should the room temperature at any time during the Time-O-Stat operation, fall to the indicator setting, the Time-O-Stat will return the heating system to the command of the room Thermostat until room temperature has been increased to 2° above indicator setting. This assures that a uniform lowered temperature will be maintained. Two models are available: the T100 for use with Series 10 or Series 80 (two wire low voltage) Thermostats, and the T200 for use with Series 20 Thermostats.

Type T100 Time-O-Stat (Series 10 and Series 80 two wire low voltage).

Type T200 Time-O-Stat (Series 20).

Temperature Range: 45 to 69° F.

Operating Differential (adjustable) 10 hours maximum.

Finish: Sprayed Silver, Sand Blast finish may be had on special order at no extra charge.



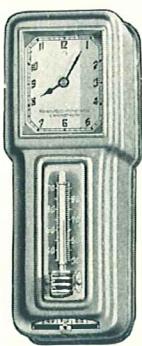
TYPE	CODE	SHIP. WT.	LIST PRICE
T10A	Abwjx	2 lbs.	\$ 9.00
T11A	Abwox	2 lbs.	9.00
T20A	Abyjx	2 lbs.	9.00
T21A	Abypx	2 lbs.	9.00



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Room Thermostats

CHRONOTHERMS



The T105 Heat Accelerated Chronotherm incorporates the exclusive Minneapolis-Honeywell feature of applying artificial heat only after there has been a definite rise in room temperature while the T205 Chronotherm employs the Heat Leveling principle to maintain a uniform temperature control. Shorter and more frequent system operations are obtained with the Heat Acceleration and Heat Leveling features, thereby eliminating "Cold 70°," under-shooting and over-shooting. The result is evenized temperature and increased system efficiency. The Chronotherm will automatically reduce the thermostat setting at a predetermined time each night and each morning will return the indicator to the day time temperature level. Operating from the house lighting circuit, the synchronous electric clock motor keeps accurate time. In the event of power failure, the clock automatically restarts on power resumption. The T12 and T22 Chronotherms are extremely accurate electric clock thermostats and do not employ artificial internal heat. In ordering the T105 and T205 Chronotherms, specify the controls being used, together with voltage and frequencies.

Type T105 Heat Accelerating Chronotherm (Series 10).

Type T205 Heat Leveling Chronotherm (Series 20).

Type T12 Chronotherm (Series 10).

Type T22 Chronotherm (Series 20).

Operating range: 55 to 85° F. Silver finish.

Standards Models: 110 volts 60 cycles. For 110 or 220 volt 25 or 50 cycles and for 220 volt 60 cycle applications, add \$2.00 list extra. All models low voltage—furnished with separate transformer.

For locking device, add \$2.00 list extra.

For Weekend Shutoff with adjustable Holiday Shutoff, add \$4.00 list extra.

In ordering T105 and T205 Chronotherms specify control to be used with voltage and frequency.

T12 available for cooling control on special order and at an extra charge of \$4.00 list. T105 and T205 Chronotherms not available for cooling control.

DA-NITE ACRATHERM

This type of thermostat combines into one instrument features of closer temperature control as offered by the Acraetherm and lowered night temperatures as offered by the Time-O-Stat. The Da-Nite Acraetherm is designed for "Series 10" wiring—with or without Heat Acceleration. Heat Acceleration is the exclusive Minneapolis-Honeywell feature for improving heat distribution and eliminating overshooting and under-shooting of room temperatures. Specifications of heating elements are the same for the Da-Nite Acraetherm as for the Acraetherm except in reference to OS numbers. These thermostats are equipped with black setting wheel and winding knob—both on the same shaft—presenting the simplest of adjustment features in eliminating the necessity of arithmetical calculations.

When ordering the Type T209, always specify type of controls being used, together with voltage and frequency.

Type T108 (Series 10)

Type T109 (Series 10—Heat Acceleration).

TYPES T208 AND T209 DA-NITE THERMOSTATS

The Type T208 is the standard "Series 20" device; the Type T209 incorporates the Heat Leveling feature with the standard "Series 20" device. Specifications of heating elements are the same for the Da-Nite Thermostat as for the Type T21 Thermostat except in reference to OS numbers.

When ordering the Type T209, always specify type of controls being used, together with voltage and frequency.

Type T208 (Series 20)

Type T209 (Series 20—Heat Leveling).

GENERAL SPECIFICATIONS:

Scale Range: **Day**, 55-85° F.; **Night**, 45-75° F.

Locking device available at no extra charge.

Dif. (adj.) Type T108A, 1½° F.; Type T109A, 3° F.; Type T208, 1° F.; Type T209, 1½° F.

Finish: Silver.

EIGHT-DAY CLOCK TYPE THERMOSTATS

These clock thermostats automatically lower the thermostat setting at night and raise it again to the day time setting in the morning. All models are equipped with eight-day seven jewel clocks of high quality. The T178A (7710HA) Heat Accelerated thermostat offers the exclusive Minneapolis-Honeywell feature of employing artificial heat only after there has been a definite rise in room temperature. Heat Leveling is incorporated in the T278A (77HA) to maintain a more uniform temperature. Introduction of artificial heat results in shorter and more frequent burner operations and thereby eliminates "Cold 70°," under-shooting and over-shooting. The Types T177 (7710) and T277 (77) are accurate and dependable clock type thermostats and do not utilize artificial heat.

Type T177 Eight-day Clock Type Thermostat (Series 10).

Type T178* Eight-day Clock Type Thermostat (Heat Accelerated) (Series 10).

Type T277 Eight-day Clock Type Thermostat (Series 20).

Type T278* Eight-day Clock Type Thermostat (Heat Leveling) (Series 20).

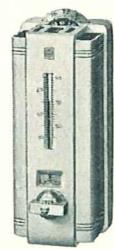
*Specify control equipment being used, together with voltage and frequency.

Operating Range 55°-85°F.—Differential (adj.) 2°F.

Finish: Silver. For standard special finishes add \$4.00 list extra in all quantities. For special finishes requiring matching of color, write for special quotations.

For Nite Switch add \$4.00 list extra. For Week-end shutoff with adjustable Holiday shutoff add \$4.00 list extra. For special scales lower than 100°F. add \$4.00 list extra in all quantities. Special scales over 100°F. add \$10.00 list extra.

The T177 and T277 8-day clock Thermostats are available for cooling control. See information under heading "Room Thermostats for Heating or Cooling Control." Series 10 models are not stocked and are built on receipt of order giving full details of temperature ranges desired. Extra charge for special construction to be used in cooling control \$4.00 list extra. The T178 and T278 models are not available for cooling control.



TYPE THERMOSTATS

TYPE	CODE	SHIP. WT.	LIST PRICE
T108A	Acqvx	2 lbs.	\$19.00
T109A	Acrcx	2 lbs.	19.00
T208A	Acrfx	2 lbs.	19.00
T209A	Acrgx	2 lbs.	19.00

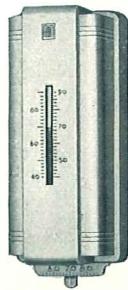


TYPE	CODE	SHIP. WT.	LIST PRICE
T177A (7710)	Abxtx	4 lbs.	\$42.00
T178A (7710HA)	Abxux	4 lbs.	42.00
T277A (77)	Acfex	4 lbs.	42.00
T278A (77HA)	Acfgx	4 lbs.	42.00

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Room Thermostats



T44 SNAP ACTION THERMOSTAT AND T45 HEAT LEVELING SNAP ACTION THERMOSTAT

The Types T44 and T45 Thermostats are snap action open contact thermostats actuated by a bimetallic element. They are modern in design and extremely accurate in operation. The T45 incorporates the Heat Leveling feature to give an evenized temperature at all times. These thermostats are for two wire line voltage applications of limited capacity designed for use with series 40 Lockswitches, relays, solenoid and motorized valves and motor loads within rating shown below. In ordering specify type of control being used—giving voltages and frequency of application—or give full load motor current.

Type T44 Thermostat (without Heat Leveling Feature) (Series 40).

Type T45 Heat Leveling Thermostat (Series 40).

Range: 55 to 85° F.—Differential: 1½° F. Finish: Silver.

Two wire line voltage.

A.C. Rating: Current rating: 5 amps. 110 V., 2.5 amps. 220 V.

Motor rating: 1/4 H.P. R.I., 1/6 H.P. S.P. (low starting current).

D.C. Rating: 15 volt amperes (maximum voltage 250 V., D.C.).

Locking device available on order at no extra charge.

Centigrade scale equivalent to standard scale available at no extra charge.

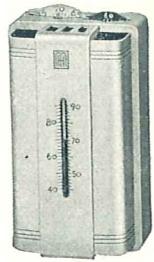
Not available for use as a cooling control

Replacing 192 Thermostats

TYPE	CODE	SHIP. WT.	LIST PRICE
T44A	Acbrx	2 lbs.	\$9.00
T45A	Acbxz	2 lbs	9.00



TYPE	CODE	SHIP. WT.	LIST PRICE
T42A	Abzlx	3 lbs.	\$10.50
T62A	Acexg	3 lbs.	10.50



TYPE	CODE	SHIP. WT.	LIST PRICE
T18A	Abxyx	3 lbs.	\$17.00
T19A	Abzxz	3 lbs.	17.00
T28A	Abzhx	3 lbs.	17.00
T29A	Abzix	3 lbs.	17.00



TYPE	CODE	SHIP. WT.	LIST PRICE
T491B (149)	Acfnx	4 lbs.	\$13.50

TYPES T42 AND T62 THERMOSTATS

Type T42 is used on control systems wherein Thermostat controls motor directly. It is a 2-wire line voltage bellows actuated mercury switch thermostat particularly fitted for direct control of oil burners, automatic coal burners, unit heaters, etc., whose motors are within ratings shown below. Can be used with magnetic starter on larger or polyphase motors. Type T62 is for control of 3-wire line voltage single pole double throw circuits (Series 60), such as are used with program control motors, motorized valves, etc

Type T42A—2-wire, line voltage.

Current rating: 8A., 110V.; 4A., 220V. A.C. or D.C.; 1/2A., 440 or 550V. A.C.

Motor Rating: 110-250V., 1/2 H.P. R.I., 1/6 H.P. S.P. or D.C.

Standard Scale Ranges: 40°-80° F. or 60°-100° F. (Specify). Diff. 2°-3° F. dependent on rate of temperature change

Special scale range 80°-120° F. add \$4.00 list extra.

Locking device available on order at no extra charge.

Finish: Bronze standard. Silver finish available on order at no extra charge.

Type T42B like T42A except reverse acting for cooling control.

Type T62 like T42 except 3-wire S.P.D.T. (Series 60) inherently suitable for heating or cooling control.

Rating: 3A., 20V.; 1A., 110V.; 1/2A., 220V. Motor Rating: 1/20 H.P. S.P., R.I. D.C. at 110V or 220V

TWIN ACRATHERM

The Twin Acratherm combines two thermostats into one unit, each operating independently of the other. One maintains constant temperatures during the day, the other performs the same function at night. The Type T19 Twin Acratherm includes the exclusive Minneapolis-Honeywell feature of Heat Acceleration. Specifications of heating elements are the same for the Twin Acratherms as for the Acratherm except in reference to OS numbers. Switching the control from one thermostat to the other can be done by a manual switch or a standard electric time switch.

When ordering the Type T19, always specify type of controls being used, together with voltage and frequency.

Type T18 (Series 10).

Type T19 (Series 10—Heat Acceleration).

TYPES T28 AND T29 TWIN THERMOSTATS

The Type T28 is the standard "Series 20" device; the Type T29 incorporates the Heat Leveling feature with the standard "Series 20" device. Specifications of heating elements are the same for the Twin Thermostat as for the Type T21 Thermostat except in reference to OS numbers.

When ordering the Type T29, always specify type of controls being used, together with voltage and frequency.

Type T28 (Series 20).

Type T29 (Series 20—Heat Leveling).

GENERAL SPECIFICATIONS

Scale Range: Day thermostat, 55° to 85° F.; Night thermostat, 50° to 74° F.

Locking device available at no extra charge.

Not available for cooling control.

Diff. (adj.) Night: 2°-3° F. Day: Type T18A, 1½° F.; Type T19A, 3° F.; Type T28A, 1° F.; Type T29A, 1½° F.

Finish: Silver

TYPE T491B (149) AIRSWITCH

Particularly desirable where sensitivity is not required as much as range of operation the T491B (149) is widely used on industrial applications such as garages, factories, warehouses or greenhouses. It is sturdily constructed and will withstand extreme conditions of temperature and humidity.

Type T491B, 2-wire, for line voltage circuits.

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: 1/6 H.P. S.P. and D.C.

Operating Range: 15°-95° F. Diff. Adj. Approx. 3°-8° F. Sprayed aluminum.

Type T491A Airswitch should be ordered for cooling control—see description on page 26. Locking device standard.

THERMOSTAT GUARD

The W50 Thermostat Guard is a practical and decorative accessory for Manual and Clock Thermostats. A lock and key are furnished.

The W51 Thermostat Guard is a rugged, yet attractive appearing cast guard built especially for gymnasiums, shops, asylums, etc.

Type W50-1, Silver or bronze finish.

Not to be used with Chronotherm.

Type W51-1 is designed to fit over any M. H. R. manual thermostat, bronze finish or may be obtained unfinished.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Temperature Controllers



IMMERSION AQUASTATS

The Types L165 (B6510) Series 10 and L265 (B2) Series 20 Aquastats comprise a line of low voltage open contact instruments meeting most water limit control problems, for either high or low limit control operation. Requires $\frac{3}{4}$ " boiler tapping.

Type L165 Aquastat; Series 10 Immersion Aquastat.

Standard Scale Range: 90°-220° F. (Diff. 10° F. adjustable.) Suitable for use as either high or low limit controller. Provided with closed protecting well and cut-off switch.

Type L265 Aquastat; Series 20 Immersion Aquastat.

Scale Range: 100°-240° F. (Diff. 10° F. adjustable.) Suitable for use as high limit controller only.

TYPE	CODE	SHIP. WT.	LIST PRICE
L165A (B6510)	Abtqx	4 lbs.	\$11.00
L265A (B2)	Absyx	4 lbs.	11.00



PRESSURETROL

These type Pressuretrols are pressure operated limit controllers. By tilting a mercury switch through expansion and contraction of a bellows, the boiler pressure is held within set limits. Equipped with outside setting adjustments and visible scales.

Type L104 (Series 10) low voltage 3 amps. 20 volts.

Type L204 (Series 20) low voltage 3 amps. 20 volts.

Type L404 (Series 40) line voltage 2-wire.

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: $\frac{3}{4}$ H.P. R.I., $\frac{1}{4}$ H.P. S.P. and D.C.

Type L604 (Series 60) Line or Low Voltage, 3-wire, 1 amp., 110V., $\frac{1}{2}$ amp., 220V.

Standard cut-in pressure range: 0 to 10 lbs. Diff.: $\frac{1}{2}$ to 6 lbs.

Ranges available at \$2.50 list extra: 2 to 50 lbs. Diff.: 2 to 12 lbs.; 5 to 150 lbs. Diff. 2-5 to 16 lbs.

Cut-in pressure plus differential equals cut-out pressure. Height, 7"; Width, 4"; Depth, 2 $\frac{1}{2}$ ".

Type L91 (Series 90) Low Voltage A.C. Modutrol or Proportioning Service.

Pressure Ranges: 0 to 10 lbs. Modulating Range: + or - $\frac{3}{8}$ lb.

Pressure Ranges: 2 to 50 lbs. Modulating Range: + or - 1 lb. (Add \$2.50 to list price.)

Pressure Ranges: 5 to 150 lbs. Modulating Range: + or - 2 lbs. (Add \$2.50 to list price.)

Dimensions: Height, 7"; Depth, 2 $\frac{1}{2}$ "; Width, 4".

Note: Supersensitive Instruments in Series 20 (3-wire low voltage), and Series 90 (Proportioning) can be furnished for close control of pressure. Information on request.

TYPE	CODE	SHIP. WT.	LIST PRICE
L104A	Acfzx	2 lbs.	\$ 8.00
L204A	Acgix	2 lbs.	8.00
L404A	Acgmx	2 lbs.	8.00
L604A	Achfx	2 lbs.	9.00
L91A2	Achpx	2 lbs.	11.00



VAPORSTAT

Like Pressuretrols in all respects except for larger bellows to adapt them to requirements of vapor pressures.

Type L108 (Series 10) low voltage 3 amps. 20 volts.

Type L208 (Series 20) low voltage 3 amps. 20 volts.

Type L408 (Series 40) line voltage 2-wire.

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: $\frac{3}{4}$ H.P. R.I., $\frac{1}{4}$ H.P. S.P. and D.C.

Cut-in pressure range: 0 to 16 ozs. Diff.: 1 to 16 ozs. Cut-in pressure plus differential equals cut-out pressure. Height, 7"; Width, 5"; Depth, 5".

Type L608 (Series 60) Line or Low Voltage, 3-wire.

Current Rating: 1A., 110V.; $\frac{1}{2}$ A., 220V. Motor Rating: 1/20 H.P., A.C. or D.C.

Other Specifications like Type L408.

Type L91 (Series 90) Low Voltage A.C. Modutrol or Proportioning service. Pressure Range, 0-16 oz. Modulating Range $\pm \frac{3}{4}$ oz.

TYPE	CODE	SHIP. WT.	LIST PRICE
L108A	Acgfx	3 lbs.	\$13.75
L208A	Acglx	3 lbs.	13.75
L408A	Acgsx	3 lbs.	13.75
L608A	Achjx	3 lbs.	14.75
L91A1	Achox	3 lbs.	12.00



VACUUMSTAT

This new controller answers the demand for a pressure-vacuum instrument. It is recommended for use only on vacuum pump equipped heating jobs.

Type L411 Vacuumstat (Series 40) line voltage 2-wire.

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: $\frac{3}{4}$ H.P. R.I., $\frac{1}{4}$ H.P. S.P. and D.C.

Cut-in range 22" vacuum to 35 lbs. pressure. Differential 4" vacuum to 30 lbs. pressure.

Cut-in pressure plus differential equals cut-out pressure. Height, 7"; Width, 4"; Depth, 2 $\frac{1}{2}$ ".

Type L614 Vacuumstat (Series 60) Line or Low Voltage, 3-wire.

Current Rating: 1A., 110V.; $\frac{1}{2}$ A., 220V. Motor Rating: 1/20 H.P., A.C. or D.C.

Other Specifications same as Type L411.

Type L91 Vacuumstat (Series 90) Low Voltage A.C. Modutrol or Proportioning Service.

Pressure Range: 22" Vacuum, 35 lbs. Pressure.

At 22" Vacuum. Modulating Range: 3 $\frac{1}{8}$ " of Mercury.

At 0 lbs. Modulating Range: 1 $\frac{3}{4}$ lbs.

At 10 lbs. Modulating Range: 2 $\frac{1}{4}$ lbs.

At 35 lbs. Modulating Range: 2 $\frac{3}{4}$ lbs.

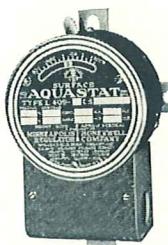
Overall Dimensions: Height, 7"; Width, 4"; Depth, 2 $\frac{1}{2}$ ".

TYPE	CODE	SHIP. WT.	LIST PRICE
L411A	Acgux	2 lbs.	\$13.75
L614A	Achjx	2 lbs.	14.00
L91A	Acfyx	2 lbs.	13.00

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Temperature Controllers



SURFACE AQUASTAT

These type Aquastats are strap-on hot water temperature controllers operated by heat transfer from the riser through the back plate, actuating a bimetal element and mercury switch. Since these devices are for surface mounting, draining or tapping of the boiler is unnecessary. Front reading scale and outside setting lever are provided and pipe straps are furnished. Surface Aquastats are arranged for mounting on either vertical or horizontal pipes.

Type L109 (Series 10) 3-wire low voltage, 3 amps. 20 volts.

Type L209 (Series 20) 3-wire low voltage, 3 amps. 20 volts.

Type L409 (Series 40) line voltage 2-wire.

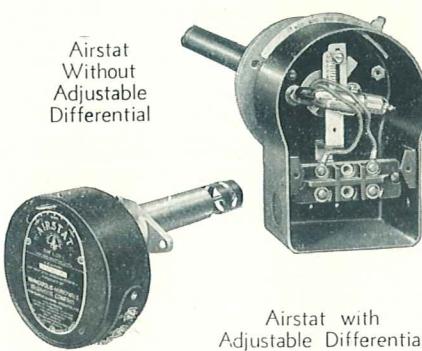
Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: $\frac{3}{4}$ H.P. R.I., $\frac{1}{4}$ H.P. S.P. and D.C.

Operating Range: 60°-200° F. Differential (fixed): Approx. 15° dependent on rate of temperature change.

Surface Aquastats are suitable only for use as high limit controllers. For maintaining minimum boiler temperatures use L165(B6510), L116, or L416 Immersion Aquastats.

TYPE	CODE	SHIP. WT.	LIST PRICE
L109A	Abokx	1 lb.	\$8.00
L209A	Abonx	1 lb.	8.00
L409A	Aboqx	1 lb.	8.00

Airstat
Without
Adjustable
Differential



Airstat with
Adjustable Differential

TYPE	CODE	SHIP. WT.	LIST PRICE
L115A	Ababx	6 lbs.	\$11.50
L215A	Abadx	6 lbs.	11.50
L415A	Abagx	6 lbs.	11.50
L119A	Abacx	6 lbs.	8.00
L219A	Abafx	6 lbs.	8.00
L419A	Abajx	6 lbs.	8.00

These type Airstats are warm air furnace temperature controllers used to prevent excessive or dangerous temperature in the bonnet. An important feature of the following models is the means provided for adjusting the operating differential. Airstats may be used in dual control with room thermostats or as primary controllers of the furnace when no room thermostat is used.

Type L115 (Series 10) low voltage, 3 amps. 20 volts.

Type L215 (Series 20) low voltage, 3 amps. 20 volts.

Type L415 (Series 40) 2-wire line voltage.

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: $\frac{3}{4}$ H.P. R.I., $\frac{1}{4}$ H.P. S.P. and D.C.

Operating Range: 100°-500° F.

Differential: Adjustable, Approx. 25 to 100°, dependent on rate of temperature change.

These type Airstats are also available without the adjustable differential feature. Visible scale marked "Low" and "High," with midpoint calibrated for 200° F. The fixed differential in this new device is approximately 25 to 50° dependent upon rate of temperature change. Outside contacts for Series 10 and Series 20 devices, conduit outlet for Series 40.

Type L119 (Series 10) 3 amps., 25 volts.

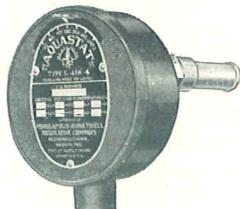
Type L219 (Series 20) 3 amps., 25 volts.

Type L419 (Series 40) 2-wire line voltage.

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: $\frac{3}{4}$ H.P. R.I., $\frac{1}{4}$ H.P. S.P. and D.C.

Operating Range: Approximately 50 to 300° F., marked 200° F. at midpoint, ends marked "High" and "Low."

Operating Differential: (Not adjustable) approximately 25-30° F. depending upon rate of temperature change.



IMMERSION AQUASTAT

These type Aquastats are immersion type temperature controllers for use with hot water heating systems. They are most commonly used to prevent the generation of excessive temperature of the water in the boiler, and with summer-winter line voltage hookups. Requires $\frac{3}{4}$ " boiler tapping.

Type L116 (Series 10) low voltage, 3 amps., 20 volts.

Suitable for use as high or low limit controller.

Type L216 (Series 20) low voltage, 3 amps., 20 volts. For use only as a high limit controller.

Type L416, 2-wire, for line voltage circuits.

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: $\frac{3}{4}$ H.P. R.I., $\frac{1}{4}$ H.P. S.P. and D.C.

Standard Range: 60°-210° F. Special Scale Range: 90°-240° F. Available on special order at no extra charge.

Differential: Approximately 10° F., dependent on rate of temperature change.

TYPE	CODE	SHIP. WT.	LIST PRICE
L116A	Abtgx	5 lbs.	\$11.00
L216A	Abtix	5 lbs.	11.00
L416A	Abtjx	5 lbs.	11.00

TYPE	CODE	SHIP. WT.	LIST PRICE
L104B	Acgcx	2 lbs.	\$8.00
L404B	Acgpx	2 lbs.	8.00
L109B	Abolx	1 lb.	8.00
L409B	Aborx	1 lb.	8.00
L109C	Abomx	1 lb.	8.00
L409C	Abosx	1 lb.	8.00
L108B	Acghx	3 lbs.	13.75
L408B	Acgtx	3 lbs.	13.75

UNIT HEATER CONTROLLERS

These Unit Heater Controllers permit unit heater fan motors to operate only when there is sufficient temperature or pressure in the unit heater to prevent the circulation of cold air. The Pressuretrol is for steam systems only, and regulates fan motor operation through pressure variations. If it is desired to control fan motor operation according to the temperature in the Unit Heater, the Surface Aquastat is used. Both controllers are equipped with a mercury switch. Core mounting type is recommended.

These Unit Heater controllers have the same specifications as Pressuretrols and Surface Aquastats, except mercury switch is reverse acting.

Types L108 and L408 are Vaporstats.

Types L104 and L404 are Pressuretrols.

Types L109C and L409C are Surface Aquastats for core mounting, equipped with perforated back plate.

Types L109B and L409B are Surface Aquastats for pipe mounting.

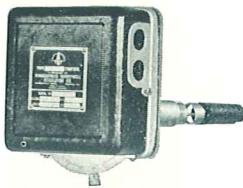
Motor Rating: Types L404, L408, L409C and L409B: $\frac{3}{4}$ H.P. R.I., $\frac{1}{4}$ H.P. S.P. and D.C.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Furnace Fan Controllers

AIR CONDITIONING FURNACESTATS



TYPE	CODE	SHIP. WT.	LIST PRICE
L30A	Absnx	12 lbs.	\$37.50
L30B	Absox	12 lbs.	37.50

The growing need for a unit assembly combining the control functions necessary to domestic air conditioning systems is capably met by the L30 Air Conditioning Furnacestat. This device is available in two models, each of which has been carefully designed to provide fully automatic operation of the heat source in relation to operation of the circulating fan, water valve, and other accessory units of the system. Provision is made for automatic control of summer cooling, a furnace temperature over-run safety feature is standard on all models, and various other highly desirable and necessary features are incorporated. The Air Conditioning Furnacestat replaces the conventional Limit Control and Furnacestat, and is used in conjunction with the other controls necessary on the usual installation.

Type L30A, Single stage operation.

Thermostat: Any Series 20. Heat Source Control: Any Series 10 Valve or Relay.

Type L30B Single stage operation.

Thermostat: Any Series 20. Heat Source Control: Any Series 20 Motor or Valve.

Transformer supplied and permanently attached to back plate.

Swivel Mounting bracket for installation on any furnace casing.

Fan Control Switch:

Current Rating: 10 amps., 110 volts; 5 amps., 220 volts. Motor Rating: 1 H.P. R.I., $\frac{1}{2}$ H.P. S.P. and $\frac{1}{4}$ H.P. D.C. Standard model 110 volt, 50 or 60 cycle. For other A.C. voltage and frequencies add \$4.00 to list price. Not available for D.C.



TYPE	CODE	SHIP. WT.	LIST PRICE
L121A	Abtnx	5 lbs.	\$19.00
L221A	Abtox	5 lbs.	19.00
L421A	Abtpx	5 lbs.	19.00

COMBINATION MULTISPEED FAN CONTROLLER

This instrument is designed for two-speed fan operation. The fan will operate at low speed after the proper bonnet temperature is reached until an increase in the bonnet temperature equals the amount of the set differential. The fan will then operate at high speed until required room temperature is reached. At that time the fan will return to low speed operation and continue in operation until the bonnet temperature drops the amount of the set differential, adjustable from 20° to 40° F., below the cut-in point of low speed fan operation.

For summer operation, the fan will operate at high speed whenever the room temperature mounts above the setting of the thermostat indicator.

Type L121A (Series 10)

Type L221A (Series 20)

Type L421A (Series 40)

Limit Control Switch:

Current Rating: L121, L221; 3 amps. 20 volts.

Current Rating: L421; 10 amps. 110 volts, 5 amps. 220 volts.

Motor Rating: L421; 1 H.P. R.I., $\frac{1}{2}$ H.P. S.P., $\frac{1}{4}$ H.P. D.C.

Fan Control Switch:

Current Rating: 10 amps. 110 volts; 5 amps. 220 volts.

Motor Rating: 1 H.P. R.I., $\frac{1}{2}$ H.P. S.P., $\frac{1}{4}$ H.P. D.C.

Fan Scale Range: 50°-175° F.

Fan control and limit control differential adjustable as a unit: 20° to 40° F.

COMBINATION FURNACE CONTROLLER

The Combination Furnace Controller operates as a furnace fan controller to regulate furnace fan operation and also serves as a temperature controller to prevent excessive bonnet temperatures. It may be wired in parallel with the burner motor to shut off the fan as soon as the burner shuts down. Fan operation can be suited to each installation, as temperature settings are adjustable.

Type L101A (Series 10) without over-run switch.

Type L101B (Series 10) with over-run switch.

Type L201A (Series 20) without over-run switch.

Type L201B (Series 20) with over-run switch.

Type L401A (Series 40) without over-run switch.

Type L401B (Series 40) with over-run switch.

Limit Control Switch:

Current Rating: L101, L201; 3A., 20V.

Current Rating: L401; 10A., 110V.; 5A., 220V.

Motor Rating: L401; $\frac{3}{4}$ H.P. R.I.; $\frac{1}{4}$ H.P. S.P. and D.C.

Fan Control Switch:

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: 1 H.P. R.I.; $\frac{1}{2}$ H.P. S.P. and $\frac{1}{4}$ H.P. D.C.

Fan Scale Range 50° to 175° F.

Limit Control Setting: Factory setting 75° F. above fan cut in point—adj. 20° to 90° above fan cut in point.

Fan control and limit control differential adjustable as a unit: 20° to 40° F.



TYPE	CODE	SHIP. WT.	LIST PRICE
L412C	Abtfx	6 lbs.	\$13.75
L412A	Abtdx	6 lbs.	11.00

TYPE L412 FURNACESTAT

The Furnacestat starts the fan motor when the temperature reaches a predetermined point, circulating the warm air through the system. It shuts off the fan motor when the bonnet temperature drops below the Furnacestat setting. Furnacestats are equipped with outside scale adjustment, and an adjustable operating differential setting is incorporated inside the case so that fan operation may be varied to suit the particular installation.

Type L412C is for use with coal fired installations and is equipped with a mercury switch and arm extension which is attached to the damper chain to stop the fan when the thermostat calls for less heat.

Type L412A employs but one mercury switch to start and stop the fan.

Type L412 Furnacestat (Series 40) for 2-wire line voltage circuits.

Current Rating: 10 amps., 110 volts; 5 amps., 220 volts. Motor Rating: $\frac{3}{4}$ H.P. R.I., $\frac{1}{2}$ H.P. S.P. or $\frac{1}{4}$ H.P. D.C.

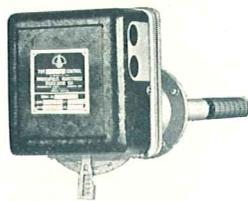
Scale Range: 100 to 300° F.

Minimum Differential: 15° F.; Maximum Differential: 100° F., dependent on rate of temperature rise.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Furnace Fan Controllers—Low Water Controls—Combustion Controls



TYPE	CODE	SHIP. WT.	LIST PRICE
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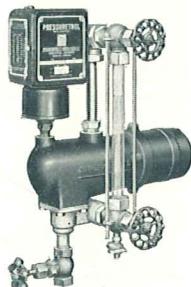
L417A	Abtlx	10 lbs.	\$27.50
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Type L417 Two Speed Furnace Fan Controller (Series 40).

For two speed fan motor control of fan motor which does not require more switching function than closing of two circuits and opening of one circuit to change from low to high speed, and the breaking of two circuits and the closing of one circuit to go from high to low speed.

Adjustable range 100 to 175°, with summer position placing fan on either high or low speed depending upon setting. Operating Differential: (Adjustable) 15 to 75° F. Temperature point of change over from low to high speed (adjustable) 10 to 50° F. Current Rating: 10 amps., 110 volts; 5 amps., 220 volts. Motor Rating: $\frac{3}{4}$ H.P., R.I.; $\frac{1}{4}$ H.P., S.P. Standard model 110 volt, 50 or 60 cycle. For other A.C. voltages and frequencies add \$2.00 list extra. Not available for D.C.

Low Water Controls



TYPE	CODE	SHIP. WT.	LIST PRICE
C402-1	Lunex	7 lbs.	\$19.00
C602-1	Lunfx	7 lbs.	21.00
L622-1	Dupsm	22 lbs.	21.50

Type C402-1 (Series 40). For use with pressures not exceeding 10 lbs. per sq. inch. Electrical rating: 10 amps. at 110 volts and 5 amps. at 220 volts. Motor rating: $\frac{3}{4}$ H.P. R.I. and $\frac{1}{4}$ H.P. S.P.

Type C602-1 (Series 60). Otherwise similar to Type C402-1.

Type L622-1 (Series 60). High Pressure Lo-Water Cutoff (maximum pressure 150 lbs.).

Combustion Controls



TYPE	CODE	SHIP. WT.	LIST PRICE
C57-1	Carlt	6 lbs.	\$18.00

Type C57-1 Protectostat: 2-wire line or low voltage.

To be used with following Protectorelays: R100A, R103A, R105A, R113A, R114A.

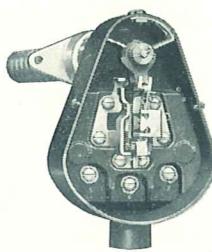
THE PROTECTOSTAT

The Protectostat is a combustion safety device, which responds to the radiant energy of the flame and is for use with series 10 controls only. Its speed of operation and its adaptability to integral mounting has made this device popular as an oil burner control. Its operating mechanism consists of a diaphragm, exposed to the flame, and a contact mechanism actuated from expansion and contraction of the diaphragm.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

MINN
AUTOMATIC CONTROLS

Combustion Controls—Protectorelays



THE PYROSTAT

The Pyrostat mounts in the stack or breeching, and in conjunction with the proper Protectorelay, provides safe operation of the burner. It is actuated by the heat of the products of combustion. A helix of thermostatic metal, responding to changes in temperature, turns a shaft which operates the contact mechanism. Provided with bracket and sheet metal screws for mounting.

Type C40-3: 2-wire line or low voltage. Fixed timing.

To be used with following Protectorelays: R100A, R103A, R105A, R113A, R114A.

Type C56-1: 3-wire line or low voltage.

To be used with following Protectorelay: R101A.

Maximum operating temperature all Pyrostats: 1100° F.

When used in extremely low stack temperatures and proper operation does not result, a special thermostatic helix, No. 60326, is available that will work satisfactorily in temperatures of 400° or less and is especially fast acting below 300°.

Protectorelays

TYPE R100A

This is a primary control applicable to gun type oil burners of the intermittent ignition type. Ignition timing is provided by the Protectostat or Pyrostat. Flame failure results in immediate safety shutdown, no ignition return being permitted. The control does not recycle in event of flame failure. The combustion safety circuit is 2-wire line voltage.

Type R100A Protectorelay (Series 10).

Used with following equipment:

Thermostats: A.C. Models any Series 10; D.C. Models any Series 40.

Limit Controls: A.C. Models any Series 10 or 40; D.C. Models any Series 40.

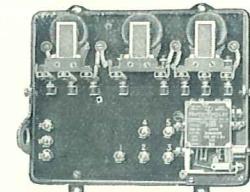
Combustion Safeties: C57-1 Protectostat or C40-3 Pyrostat.

Motor Rating: 1 H.P. R.I.; 1/2 H.P. S.P. or D.C. Current Rating: 10A., 110V.; 5A., 220V., A.C.

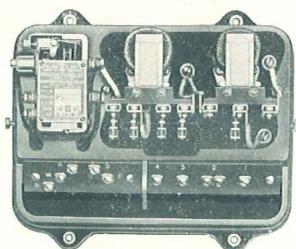
Safety Switch Timing: Approx. 2 min. at rated voltage

Furnished standard for 110 volts, 50 or 60 cycles. For other A.C. voltage and frequencies or for D.C. available at an additional charge.

Separate ignition circuit standard on D.C. model.



TYPE	CODE	SHIP. WT.	LIST PRICE
R100A	Bdzxk	14 lbs.	\$49.50



TYPE	CODE	SHIP. WT.	LIST PRICE
R114A	Becxk	11 lbs.	\$33.00

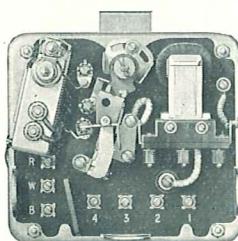
TYPE R114A

The R114A Protectorelay has practically the same sequence of operation as the R100A described above and is well suited to the atomizing type burner where ignition return is not desired. The control does not recycle in event of flame failure, but places the burner on safety in approximately 30 seconds without returning ignition. The combustion safety circuit is 2-wire low voltage, and either the C57-1 Protectostat or C40-3 Pyrostat may be used.

Type R114A Protectorelay (Series 10).

For D.C. use R100A at an additional charge.

Excepting safety switch timing at 60", other specifications same as R100A above



TYPE	CODE	SHIP. WT.	LIST PRICE
R116A	Rbxak	7 lbs.	\$29.00

TYPE R116A

Type R116A Protectorelay is a stack mounted control which combines the functions of the Combustion Safety Control and Protectorelay. It is adaptable to oil burners employing constant ignition only. In the event of flame failure, a quick shut down is assured and control will recycle to give burner one additional automatic start.

Type R116A Protectorelay (Series 10).

Thermostats: Any Series 10. Limit Controls: Any Series 10 or 40.

Motor Rating: 1 H.P. R.I.; 1/2 H.P. S.P. Safety Switch Timing: Approximately 2 minutes at rated voltage.

Standard model for 110V., 50 or 60 Cy. Additional charge applies for other voltages or frequencies.

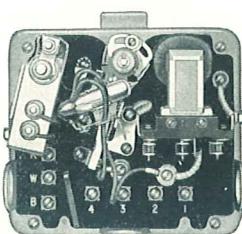
For D.C. use R416A Lockswitch, with Type T45 Thermostat.

When used in extremely low stack temperatures and proper operation does not result, a special thermostatic helix, No. 60326, is available that will work satisfactorily in temperatures of 400° or less and is especially fast acting below 300°.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Protectorelays



TYPE	CODE	SHIP. WT.	LIST PRICE
R117A	Bedxk	7 lbs.	\$32.50

TYPE R117A

The Type R117A Protectorelay is a stack-mounted control that combines the functions of a Combustion Safety Control and a Protectorelay. It is adaptable to oil burners using electric spark, expanding gas flame, or combination gas-electric ignition. The control recycles in event of flame failure giving the burner one additional automatic start. The ignition and scavenger timings are adjustable. The control circuit of the Type R117A is low voltage permitting the use of Series 10 room thermostats. It includes a Con-Tac-Tor Mercury Switch to control ignition circuit.

Type R117A Protectorelay (Series 10) for A.C. only.

Thermostats: Any Series 10. Limit Controls: Any Series 10 or 40.

Motor Rating: 1 H.P. R.I.; $\frac{1}{2}$ H.P. S.P. Ignition Rating: 3A., 110V.

Adj. for ignition timing and delayed return after flame failure. Safety Switch Timing: 75 to 100 seconds at rated voltage.

Standard model for 110 volts, 50 or 60 cycles. Additional charge applies for other voltages or frequencies.

For D.C. use R417 with T45 Thermostat.

When used in extremely low stack temperatures and proper operation does not result, a special thermostatic helix, No. 60326, is available that will work satisfactorily in temperatures of 400° or less and is especially fast acting below 300°.



TYPE	CODE	SHIP. WT.	LIST PRICE
R416A	Rbexk	7 lbs.	\$24.00
R417A	Arwxk	7 lbs.	27.00

TYPE R416A AND TYPE R417A LOCKSWITCHES

The R417A Lockswitch is a stack mounted control which combines the functions of the Combustion Safety Control and Protectorelay. It is adaptable to oil burners using electric spark, expanding gas, or combination gas-electric ignition. The control recycles in the event of flame failure, giving the burner one additional automatic start. The ignition and scavenger timing are adjustable. This control is used with the T45 line voltage thermostat.

The R416A Lockswitch performs the same function as the R116A Protectorelay. The only difference is that the control is for line voltage application, and is used with the T45 Thermostat. In event of flame failure, a quick shut down is assured and control will recycle to give burner one additional automatic start.

Types R416A and R417A Lockswitches, standard models, are 110V., 50 or 60 cycles A.C.

Additional charge applies for other voltages or frequencies and for D.C. voltages.

Thermostats: Type T45. Limit Controls: Series 40 only.

Motor Rating: 1 H.P. R.I., $\frac{1}{2}$ H.P. S.P. or D.C. Ignition Rating: R417A, 3A., 110V.

Safety Switch Timing, approximately 2 minutes at rated voltage.

When used in extremely low stack temperatures and proper operation does not result, a special thermostatic helix, No. 60326, is available that will work satisfactorily in temperatures of 400° or less and is especially fast acting below 300°.



TYPE	CODE	SHIP. WT.	LIST PRICE
R125A	Rbixk	10 lbs.	\$32.50
R126A	Rchxk	9 lbs.	29.00

PROTECTORELAYS FOR FIREDOR, BLAST TUBE OR DIRECT BOILER MOUNTING

The R125A and the R126A Protectorelays combine the functions of the combustion safety controls and the Protectorelay. They are designed for mounting on the burner blast tube, on the fire door or for direct boiler mounting. These relays provide complete control for intermittent ignition or constant ignition applications using electric spark, expanding gas flame or combination gas and electric ignition. The Everdur Diaphragm assures quick response to radiant energy of the flame. The R125A Protectorelay recycles in the event of flame failure to give the burner one more automatic start with ignition. In the event of flame failure the R126A Protectorelay goes out on safety if the flame is not re-established during safety timing period. Ignition and scavenger timing are adjustable. Control circuit—Series 10—3-wire low voltage. Intermittent ignition model includes a Con-Tac-Tor Mercury Switch to control ignition circuit.

Type R125A Protectorelay for Intermittent Ignition Applications (Series 10) for A.C. only.

Thermostat: Any Series 10. Limit Control: Any Series 10 or Series 40.

Motor Rating: 1 H.P. R.I., $\frac{1}{2}$ H.P. S.P. Ignition Rating: 3 amps., 100 volts.

Safety switch timing: Approximately 2 minutes at rated voltage and frequency.

Standard voltage: 110 volts 50 or 60 cycles—for other A.C. voltages and frequencies an additional charge for the special voltage or frequency applies. Not available for D.C.

Type R126A Protectorelay for Constant Ignition Applications (Series 10) for A.C. only.

Thermostat: Any Series 10. Limit Control: Any Series 10 or Series 40. Motor Rating: 1 H.P. R.I., $\frac{1}{2}$ H.P. S.P.

Safety switch timing: Approximately 2 minutes at rated voltage and frequency.

Standard voltage: 110 volts 50 or 60 cycles—for other A.C. voltages and frequencies an additional charge for the special voltage or frequency applies. Not available for D.C.



TYPE	CODE	SHIP. WT.	LIST PRICE
R118A	Befxk	7 lbs.	\$40.50
R157A	Belxk	10 lbs.	38.00

PROTECTORELAYS PROVIDING DELAYED CLOSING OF OIL VALVE CIRCUIT

For those oil burners requiring closing of the circuit to the motor before the oil valve is opened the Types R118A and R157A Protectorelays are available. These vary in method of installation and in method of ignition timing, but in general both operate to bring on burner motor and ignition timing when the thermostat calls for heat and after a delay of approximately 30 seconds close the circuit to the oil valve.

Used with the following equipment:

Thermostat: A.C. Models any Series 10; D.C. Models any Series 40.

Limit Controls: Any Series 10 or Series 40.

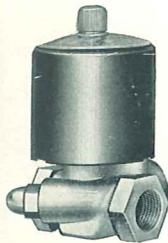
Type R118A Protectorelay, combination protectorelay and combustion safety control for stack mounting. Similar in construction to Type R117A Protectorelay. Recycles on flame failure. Ignition and scavenger timings separately adjustable. Includes Con-Tac-Tor mercury switch to control ignition circuit. Not available for D.C.

Type R157 Protectorelay provides for predetermined ignition timing, delayed oil valve timing, timed delay recycling and for use on industrial horizontal rotary burners.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Oil and Gas Pilot Valves—Solenoid Gas Valves



OIL AND GAS PILOT VALVES

Type V46 is a solenoid valve used for gas pilot regulation. This compact valve includes a by-pass adjustment and may be used either for high-low or shut-off operation. No power is consumed when valve is in closed position.

Type V46-1: Straight through pattern—left hand.

Pipe Connections: $\frac{3}{8}$ ".

Power Consumption: 8 watts. Max. Operating Pressure: $\frac{1}{4}$ lb. per sq. in.

Standard Models: 110V., 50 and 60 Cy. for other A.C. voltages and frequencies, and for D.C., add \$2.00 list.

Type 5N oil valve is a straight plunger type valve listed as a final shutoff at 15 lbs. pressure. Available only for $\frac{3}{8}$ " pipe connections.

For Commercial voltages and frequencies other than 110 volt, 50 and 60 cycles, add \$2.00 list to price unless ordered in lots of 50 or more of the same specifications, in which case there will be no extra charge. For D.C. models add \$2.00 list in all quantities.

Solenoid Gas Valves



TYPE V44-2 AND V84-2 MAGNETIC GAS VALVE

These gas valves are of the Silent Solenoid Type designed particularly for applications where quietness, ease of installation, and freedom from Service are required. The V44-2 Gas Valve is arranged for 2-wire line voltage control, opening when coil is energized and closing when coil circuit is interrupted. V84-2 Gas Valve is similar to V44-2 except designed for low voltage—current supplied by an external transformer which is supplied.

Furnished only in straight through pattern—screwed.

Pressure ratings, $\frac{3}{4}$ in. and 1 in. size, 9 oz. per sq. inch. $\frac{1}{4}$ in. size, 6 oz. per sq. inch.

Standard models, 110 volt, 50 and 60 cycle. For other A.C. voltages and frequencies add \$2.00 list.

V84-2 not available for D.C. For D.C. applications use V44-2 and add \$2.00 extra to list price.

TYPE	CODE	SHIP. WT.	LIST PRICE
V44-2			
$\frac{3}{4}$ "	Keaxk	365	5 \$12.00
1 "	Keixk	365	5 $\frac{1}{2}$ 13.00
1 $\frac{1}{4}$ "	Keokk	797	6 16.00
V84-2			
$\frac{3}{4}$ "	Koaxk	365	7 \$14.00
1 "	Koekk	365	7 $\frac{1}{2}$ 15.00
1 $\frac{1}{4}$ "	Koixk	797	8 18.00



TYPE V24-3 VALVE

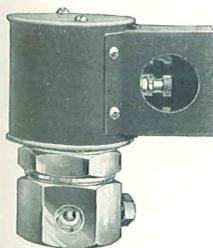
This valve is used with Series 20 room thermostats and limit controls, and in conjunction with these controls governs the gas supply on gas-heating equipment. An external transformer is furnished with each model of this valve. Thermostat and limit control circuits are low voltage. The V24-3 valve is successfully used in conjunction with a direct or reverse acting diaphragm valve, to provide electric thermostat control. A manual control feature is incorporated, permitting operation of the burner during period of power failure, with automatic return to thermostatic control upon resumption of power service. This valve not available for line voltage D.C., but the standard model may be operated from 8 dry cells.

Standard Models: 110V., 50 and 60 cycle. For other A.C. voltages and frequencies add \$2.00 list.

For use with reverse acting diaphragm equipment specify reverse action. Available at no extra charge.

Note: When using this valve with T26A Chronotherm, R20A Relay must be interposed. List price \$7.00.

TYPE	CODE	SHIP. WT.	LIST PRICE
V24-3			
$\frac{3}{8}$ "	Nobxk	2 lbs.	\$19.00



ELECTRIC PILOT VALVE

This valve is a silent solenoid type of extremely limited capacity for use with diaphragm and other non-electric control valves. Models are available for use with the Series 10 control circuit either direct or reverse acting. The Series 10 model is a low voltage valve and requires an external transformer which is supplied. Made only with $\frac{1}{4}$ " pipe tapping.

Standard models (direct action) V16-1, 110-volt, 50 and 60 cycle standard.

Standard voltage 110 volt 50 or 60 cycle. For other A.C. voltages and frequencies and for 9 Volts D.C., add \$2.00 list.

TYPE	CODE	SHIP. WT.	LIST PRICE
V16-1	lfaxk	2 lbs.	\$16.00

TYPE V80-1

MAGNETIC GAS VALVE

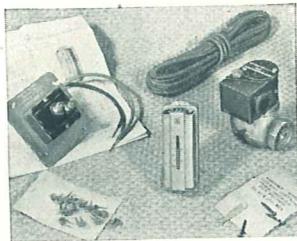
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MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Gas Regulator Package—Diaphragm Gas Valves

T11 AND V16-6—T109 AND V16-6 GAS CONTROL PACKAGES



These combination control packages provide low cost automatic controls for small conversion burners and small gas fired space heaters to replace existing manual control installation. Type Y121A consists of the new T11 Heat Accelerating Acratherm and a $\frac{3}{4}$ " V16-6 recycling Silent Solenoid Gas Valve. Quietness and positive action are assured because of its special design. In the event of power failure, valve may be manually opened. Valve will recycle to control of Acratherm upon return of current. This low voltage valve is supplied with an external transformer (power type). Type Y26A consists of the Type T109 Da-Nite Acratherm, offering both Heat Acceleration and lowered controlled temperatures, and the Type V16-6 Gas Valve.

Standard model valve, 110 volt, 50 or 60 cycle.

For other A.C. voltages and frequencies add \$2.00 list.

Provision is made for manual open during power failure periods.

Capacity 300 cu. ft. per hour, using a .6 Sp. Gr. gas at $\frac{1}{2}$ " P.D.

TYPE	CODE	SHIP WT.	LIST PRICE
Y121A	Tcexk	5 lbs.	\$26.00
Y26A	Natuk	5 lbs.	36.00

Diaphragm Gas Valves

ELECTRIC DIAPHRAGM GAS VALVES

The new line of electric diaphragm gas valves is designed to assure long dependable service. Their simplicity of construction and ease of installation readily adapts them to new as well as replacement installations. Reverse acting arm only is available on 9" diaphragm models. The 16" and 22" diaphragm models include the following features:

- (1) lever arm may be adjusted for either direct action or reverse action.
- (2) an adjustable flare pilot.
- (3) slow opening feature using a 4-prong guide with flat seat.
- (4) Series 10 models equipped with recycling solenoid control valves for manual opening during power failure periods. Series 40 models are not equipped with this feature, but may be manually opened and closed during power failure periods.

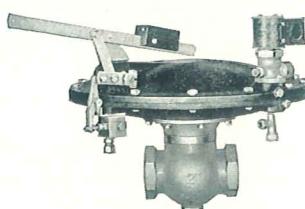
All models have manual control feature for operating during power failure. These valves are available with Series 10 or Series 40 control circuits.

Standard models (Series 40), 110 volt, 50 and 60 cycle. For other voltages and frequencies and for D.C. add \$2.00 list.

16 and 22 inch diaphragm models available on special order with V-port guide at \$4.00 list extra. The 3 in., 4 in. and 6 in. heavy duty sizes are iron body, flanged type, and the companion flanges are not included in list prices.



9" Diaphragm



16" Diaphragm

FOR SPECIFICATIONS
AND PRICES, SEE
TABULATION

9" DIAPHRAGM VALVE—SCREWED TYPE

Size	SERIES 10			SERIES 40			Capacity .6 sp. gr. gas $\frac{1}{2}$ " P. D.	Shipping Weight
	Model No.	Code Word	List Price	Model No.	Code Word	List Price		
3"	V-117-6	Vjck	\$30.00	V-417-40	Dfck	\$29.00	425 cu. ft.	10 lbs.
1"	V-117-6	Vjbxk	30.00	V-417-40	Dfbxk	29.00	625 cu. ft.	11 lbs.
1 1/4"	V-117-6	Vjcxk	33.00	V-417-40	Dfcxk	32.00	875 cu. ft.	12 lbs.

16" DIAPHRAGM VALVE—SCREWED TYPE

1 1/2"	V-118-6	Vjzxk	60.00	V-418-40	Dfxk	59.00	1160 cu. ft.	60 lbs.
2"	V-118-6	Vjhxk	68.00	V-418-40	Dfxk	67.00	1855 cu. ft.	65 lbs.
2 1/2"	V-118-6	Vjixk	77.00	V-418-40	Dfxk	76.00	2765 cu. ft.	70 lbs.
3"	V-118-6	Vjlxk	93.00	V-418-40	Dfxk	92.00	4000 cu. ft.	75 lbs.

22" DIAPHRAGM VALVE—HEAVY DUTY FLANGED TYPE

3"	V-119-6	Vjqxk	134.00	V-419-40	Dfixk	133.00	3500 cu. ft.	150 lbs.
4"	V-119-6	Vjrxk	158.00	V-419-40	Dfixk	157.00	6500 cu. ft.	210 lbs.
6"	V-119-6	Vjsxk	198.00	V-419-40	Dfixk	197.00	14000 cu. ft.	250 lbs.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

• AUTOMATIC CONTROLS
MH

Motorized Gas Valves

TYPE V15 MOTORIZED GAS VALVES

The compact Type V15 Motorized Gas Valves are now available for Series 10 and Series 40 control applications. The V15 valves incorporate a low voltage motor and are furnished with an external transformer. The V415 Motorized Gas Valves are for use with two wire line voltage control equipment or may be used on tandem installations where more than one V15 valve is required. All models are equipped with an external arm which serves both as a manual control lever and a secondary air damper control arm. In event of power failure, all models can be manually opened. However, only the V15 or Series 10 valves will automatically recycle to the position demanded by automatic control. The V415 valves must be manually closed to return to the command of the room thermostat. Series 10 models only are available for controlling an auxiliary load circuit such as other line voltage gas valves, fans or blowers.

These valves are designed for A.C. application only. Standard models 110 volt, 50 or 60 cycle. For other A.C. voltages and frequencies add \$2.00 list extra.

Capacities indicated are for .6 specific gravity gas at $\frac{1}{2}$ " pressure drop.

Sizes: $\frac{3}{4}$ ", 1", 1 $\frac{1}{4}$ ".

V15-5, V415-5—Standard models. Reverse acting lever arm.

V15-6, V415-6—Same as 5s except with direct acting lever arm. Built only on special order.

V15-7 (Series 10 only)—Standard model. Reverse acting lever arm. Equipped with external load mercury switch rated at 10 amps., 110 volts; 5 amps., 220 volts A.C.

V15-8 (Series 10 only)—Same as 7s except with direct acting lever arm. Built only on special order.

Sizes: 1 $\frac{1}{2}$ ", 2", 2 $\frac{1}{2}$ ".

V15-9, V415-9—Standard models. Reverse acting lever arm.

V15-10, V415-10—Same as 9s except with direct acting lever arm. Built only on special order.

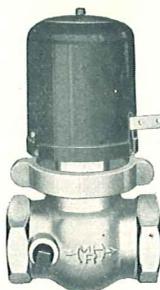
V15-11 (Series 10 only)—Standard model. Reverse acting lever arm. Equipped with external load mercury switch rated at 10 amps., 110 volts; 5 amps., 220 volts A.C.

V15-12 (Series 10 only)—Same as 11s except with direct acting lever arm. Built only on special order.

IMPORTANT: The top power units of the $\frac{3}{4}$ ", 1", and 1 $\frac{1}{4}$ " sizes are interchangeable, and the top power units of the 1 $\frac{1}{2}$ ", 2", and 2 $\frac{1}{2}$ " sizes are interchangeable. However, BECAUSE OF THE DIFFERENCE IN THE ADAPTOR PLATES, the top power units of the two size ranges are not interchangeable with each other.



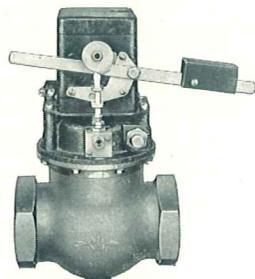
$\frac{3}{4}$ ", 1", 1 $\frac{1}{4}$ " sizes



1 $\frac{1}{2}$ ", 2", 2 $\frac{1}{2}$ " sizes

FOR SPECIFICATIONS
AND PRICES, SEE
TABULATION

Size	Capacity	Shipping Weight	SERIES 10 V 15-5		SERIES 40 V 415-5	
			Code Word	List Price	Code Word	List Price
$\frac{3}{4}$ "	400 cu. ft.	10 lbs.	Vlgxk	\$30.00	Tvaxk	\$27.00
1"	550 cu. ft.	10 lbs.	Vlixk	30.00	Tvexk	27.00
1 $\frac{1}{4}$ "	850 cu. ft.	11 lbs.	Vloxxk	33.50	Tvixk	30.50
			V 15-9		V 415-9	
1 $\frac{1}{2}$ "	900 cu. ft.	13 lbs.	Ndaxk	38.50	Tvoxk	35.50
2"	1550 cu. ft.	16 lbs.	Ndexk	42.00	Tvuxk	39.00
2 $\frac{1}{2}$ "	1950 cu. ft.	20 lbs.	Ndixk	50.00	Tvyxk	47.00
			V 15-7		Series 40 valves not available with external load circuit.	
$\frac{3}{4}$ "	400 cu. ft.	10 lbs.	Rvtxk	34.00		
1"	550 cu. ft.	10 lbs.	Rvoxxk	34.00		
1 $\frac{1}{4}$ "	850 cu. ft.	11 lbs.	Rrvrxk	37.50		
			V 15-11			
1 $\frac{1}{2}$ "	900 cu. ft.	13 lbs.	Ndokxk	42.50		
2"	1550 cu. ft.	16 lbs.	Nduxk	46.00		
2 $\frac{1}{2}$ "	1950 cu. ft.	20 lbs.	Ndyxk	54.00		



V107-1 AND V407-1* SLOW OPENING MOTORIZED GAS VALVES

These new types of Gas valves were developed to supply the growing demand for a simple and compactly built valve for use where slowness of operation through opening cycle is required. The adaptor includes an adjustable flare pilot with by-pass adjustment for off-on-off or low-high-low service. Provision is made for manual operation during power failure periods and has automatic recycling feature. Damper arm may be either direct or reverse action.

Time of opening 30 seconds—closing time approximately 3 seconds. Standard has 4-prong guide with flat seats.

The 3 in., 4 in., and 6 in. heavy duty sizes are iron body, flanged type, and the companion flanges are not furnished at above prices.

Available for A.C. applications only—standard 110 volt, 50 and 60 cycle.

V107-1 for series 10 controls uses M11-1 motor operating through external transformer. Available for other A.C. voltages and frequencies at \$2.00 list extra.

*V407-1 for series 40 controls uses M46 line voltage motor. Available for same sizes as V107-1 and at \$2.00 list less than V107-1 prices in their respective sizes. For other A.C. voltages and frequencies add \$2.00 to list price.

TYPE	CODE	SHIP. WT.	LIST PRICE
V107-1 Screwed type			
1 $\frac{1}{2}$ "	Kiaxk	1000	25 lbs. \$66.00
2 "	Kibxk	1850	33 lbs. 74.00
2 $\frac{1}{2}$ "	Kicxk	2650	40 lbs. 82.00
3 "	Kidxk	3600	55 lbs. 96.00
V107-1 Flanged type			
3 "	Kigxk	3400	100 lbs. 106.00
4 "	Kieyk	6100	125 lbs. 126.00
6 "	Kifxk	12000	170 lbs. 166.00

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

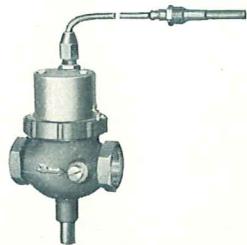


Automatic Gas Pilots

PILOTSTAT

The Pilotstat incorporates an entirely new design in automatic pilot—the widely employed thermo-electric principle, utilizing the thermo-couple and electro magnet. The new Pilotstat is now furnished with detachable thermo-couple. The difference in temperature between two thermo-couple elements, one of which is installed in the pilot flame, generates a current of sufficient magnitude to energize an electro-magnet. When the pilot flame fails, the difference between the temperatures of

the two thermo-couple elements is dissipated and current fails. Four models of Pilotstats are available. The C209A, three wire switch type; the C509A, straight through valve type; C509B, angle model $\frac{1}{2}$ " size only; and C809A, two wire switch type. All Pilotstat models are positive in action, have flexibility in application and are easily installed. Each Pilotstat should be purchased with a pilot burner.



TYPE	CODE	SHIP. WT.	LIST PRICE
C209A	Maxor	2 lbs.	\$12.00
C49-1	Czove	3 lbs.	14.00
C509A	Maxop	3 lbs.	11.00
C509B	Maxoq	3 lbs.	11.00
C809A	Maxon	2 lbs.	11.00

Standard thermo-couple lengths: 18", 24", 30" and 40". Other special lengths 6" to 48" in lots of less than 100, add 50 cents list. When Pilotstat is shipped less thermo-couple deduct \$2.00 list less discount. Separate Pilotstat thermo-couples, standard lengths \$2.00 list. Special lengths (4" to 48" in lots of less than 100) \$2.50 list.

For 90° bend at Pilotstat hood, specify. No extra charge. For manual release for either switch or valve types, add \$1.00 list.

Type **C209A Pilotstat** (3-wire low voltage ("Series 20") electric switch). Specify thermo-couple position.

Type **C49-1 Pilotstat** (2-wire line voltage electric switch). Closes circuit when thermo-couple is heated. Mounting lugs on back of case.

Type **C509A Pilotstat** (straight through valve).

Valve closes on pilot flame failure.

Available in $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{3}{4}$ " sizes. Specify size.

Type **C509B Pilotstat** (angle body valve).

Valve closes on pilot flame failure.

Available in $\frac{1}{2}$ " size only. Specify inlet size of $\frac{1}{2}$ " standard male pipe thread or $\frac{1}{2}$ "-20 tapered male thread.

Type **C809A Pilotstat** (2-wire low voltage electric switch).

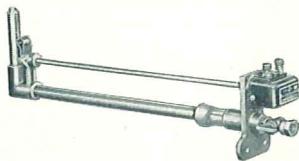
Opens two wire circuit on pilot flame failure.

Specify thermo-couple position.

Equipped with manual reset.

Pilot burner and bracket for Pilotstat \$1.65 list.

Specify SK23504 for natural gas; SK23531 for manufactured gas.

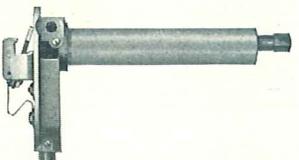


TYPE	CODE	SHIP. WT.	LIST PRICE
C80-1	Ceaxk	4 lbs.	\$13.00

TYPE C80-1 AUTOMATIC PILOT

This pilot is for use with Series 10 and 2-wire low voltage valves. Sufficient contraction of the bimetal in the pilot breaks the circuit to the main valve preventing gas flow to the burner. This device is especially suitable for installations that require an angle type pilot. The Type C80-1 has the mixer located in the gas pipe immediately in front of the bracket supporting the electrical contact assembly.

Standard Length, 14 $\frac{1}{4}$ in. For special horizontal lengths up to 20 in., add \$1.00 list extra; over 20 in., add \$2.00 list extra. Any special vertical length \$1.00 list extra. When both special horizontal and vertical lengths are supplied, charge only for vertical length. Special lengths must be in multiples of $\frac{1}{2}$ in., vertical, multiples of $\frac{1}{4}$ inch.



TYPE	CODE	SHIP. WT.	LIST PRICE
700B	Orcha	4 lbs.	\$13.00

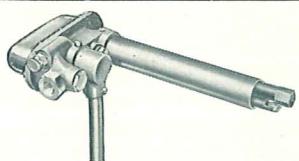
TYPE 700B ELECTRIC AUTOMATIC PILOT

This pilot is used with low voltage electric gas valves. It requires a constant pilot flame applied to the thermo tube to keep contact closed, as, if pilot light goes out, the circuit is broken and the main valve is closed. Type 700B is suitable for gas-fire furnaces or boilers.

Low Voltage: 25V., 25W. (2-wire).

Standard Length: 10 in.; special lengths available in multiples of $\frac{1}{2}$ in. at an additional list price—6 to 9 $\frac{1}{2}$ in., \$1.00 each; 10 $\frac{1}{2}$ to 22 in., \$2.00 each; over 22 in., \$4.00 each.

Please specify length, tip number and type of gas.



TYPE	CODE	SHIP. WT.	LIST PRICE
705AR	Owlet	4 lbs.	\$14.00

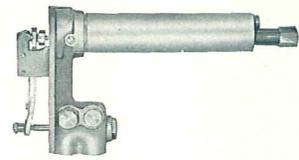
TYPE 705AR GAS AND ELECTRIC AUTOMATIC PILOT

Operation of this pilot is the same as Type 700B but in addition it incorporates a small gas valve that governs the pilot gas supply. In the event pilot light goes out this small valve closes, shutting off pilot gas supply. This is advantageous where an accumulation of a sizeable amount of gas would be dangerous.

Low Voltage: 25V., 25W. (2-wire).

Standard Length: 10 in.; special lengths at same extra charge as Type 700B Pilot.

Please specify length, tip number and type of gas.



TYPE	CODE	SHIP. WT.	LIST PRICE
720B	Papal	4 lbs.	\$14.00

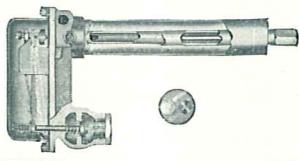
TYPE 720B AUTOMATIC PILOT FOR DIAPHRAGM VALVES

The Type 720B is designed for use with the Type 610 or 620 diaphragm valves. It is a mechanical type pilot and does not depend on electric current for its operation. Type 720B also incorporates a small valve that shuts off the pilot gas supply in case the pilot flame is extinguished.

Gas Operated.

Standard Length: 10"; special lengths at same extra charges as Type 700B Pilot.

Please specify length, tip number and type of gas.



TYPE	CODE	SHIP. WT.	LIST PRICE
730	Parap	6 lbs.	on request
731	Parbp	6 lbs.	on request
732	Parcp	6 lbs.	on request

TYPE 730 STORAGE WATER HEATER AUTOMATIC PILOT

This pilot, as its name implies, is used on storage water heaters for controlling the gas supply to the burner. Its operation does not depend on electric current, being gas operated. There are other models of Type 730 designed for special storage water heater requirements.

Standard Length, 10"; special lengths at same extra charge as Type 700B.

Type 730: $\frac{3}{8}$ " tapping.

Type 730: $\frac{1}{2}$ " tapping.

Type 732 $\frac{3}{4}$ " tapping.

Please specify length, tip number and type of gas.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Relays

RELAYS

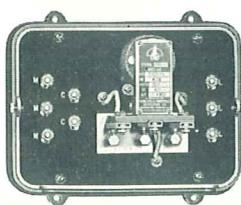
A complete line of simple and compactly designed relays is available for the requirements of various applications involving the control of the line voltage loads from sensitive low voltage thermostats or controllers, or from line voltage controllers of limited capacity. The Type R19A is very extensively used in controlling small automatic coal burner motors up to 1 H.P. R.I. and in making possible the use of Series 10 equipment including clock thermostats and Chronotherms as replacements on older installations. Other types are arranged for a wide variety of special switching operations. Each is a complete self-contained unit and those types designed for operation from low voltage thermostats and limit controls include a built in transformer to provide the thermostat circuit. All relays are furnished for standard 110 or 220 volt, 50 or 60 cycle current. Other commercial voltages or frequencies and D.C., where specified below, furnished at a \$4.00 list extra charge.



Type R19A

SINGLE PHASE RELAYS

Single Phase			Type	Control Circuit	LOAD CIRCUIT					Cabinet Size (inches overall)
Type	Code	Ship. Wt. List Price			No. of Poles	Switching Action	Relation to supply circuit	Resistance Load	Motor Load	
R12A	Bdexk	8 lbs. \$17.00	R12A	Series 10	2	double throw	separate	10 amps.—110 V. A.C. 5 amps.—220 V. A.C.	1 H.P. R.I. ½ H.P. S.P.	7 ¼ x 9 x 4 ½
R14A	Bdfxk	8 lbs. 15.00	R14A	Series 10	1	double throw	separate	10 amps.—110 V. A.C. 5 amps.—220 V. A.C.	1 H.P. R.I. ½ H.P. S.P.	7 ½ x 9 x 5
R19A	Bdixk	5 lbs. 9.00	R15A For D.C.	Std. 2-wire line voltage	1	single throw	common	5 amps.—110 V. D.C. 2 ½ amps.—220 V. D.C.	½ H.P. D.C.	6 ½ x 4 ½ x 3 ½
R61A	Bdrxk	5 lbs. 20.00	R19A	Series 10	1	single throw	common	10 amps.—110 V. A.C. 5 amps.—220 V. A.C.	1 H.P. R.I. ½ H.P. S.P.	6 ½ x 4 ½ x 3 ½
R32A	Bdkxk	8 lbs. 16.00	R61A For D.C.	Std. 3-wire line voltage	1	double throw	separate	10 amps.—110 V. A.C. 5 amps.—220 V. A.C.	1 H.P. R.I. ½ H.P. S.P.	7 ½ x 9 x 5
R33A	Bdlxk	8 lbs. 19.50	R32A	Std. 3-wire low voltage	1	double throw	separate	½ amp.—110 V. D.C. ¼ amp.—220 V. D.C.		
R39A	Bdmxk	5 lbs. 13.00	R33A	Std. 3-wire low voltage	2	double throw	separate	10 amps.—110 V. A.C. 5 amps.—220 V. A.C.	1 H.P. R.I. ½ H.P. S.P.	7 ½ x 9 x 5
R48A	Bdoxk	5 lbs. 10.50	R39A	Std. 3-wire low voltage	1	single throw	common	10 amps.—110 V. A.C. 5 amps.—220 V. A.C.	1 H.P. R.I. ½ H.P. S.P.	6 ½ x 4 ½ x 3 ½
			R48A	Std. 2-wire line voltage	1	single throw	separate	10 amps.—110 V. A.C. 5 amps.—220 V. A.C.	1 H.P. R.I. ½ H.P. S.P.	6 ½ x 4 ½ x 3 ½



Type R41A

POLYPHASE RELAYS

Type	Control Circuit	LOAD CIRCUIT					Cabinet Size (inches overall)
		No. of Poles	Switching Action	Relation to supply circuit	Resistance Load	Motor Load	
R41A	Std. 2-wire line voltage	3	single throw	separate	15 amps.—110 or 220 volts A.C.	See Note A	7 ¼ x 9 x 4 ½

A. Motor Loads: 5 H.P. 220 V. 3 phase; 5 H.P. 220 V. 2 phase, 4-wire; 3 H.P. 220 V. 2 phase, 3-wire; 3 H.P. 220 V. single phase; 2 H.P. 110 V. 3 phase; 2 H.P. 110 V. 2 phase; 1 ½ H.P. 110 V. single phase.

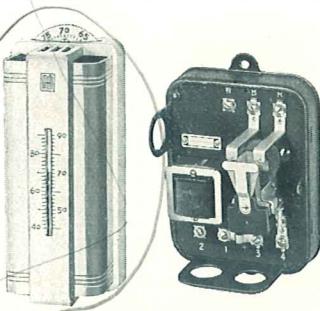
Polyphase

TYPE	CODE	SHIP. WT. LIST PRICE
R41A	Bdnxk	8 lbs. \$18.50



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Automatic Coal Burner Controls



TYPE	CODE	SHIP. WT.	LIST PRICE
Y9A	Rotxk	7 lbs.	\$18.00



(PATENT NOTICE: These Stoker switches carry with them a license to use this system of preventing extinguishment of the fire when operating under low heat requirement conditions as covered by Patent No. 1758146.)

TYPE	CODE	SHIP. WT.	LIST PRICE
L105A	Abswx	6 lbs.	\$17.50
L205A	Abszx	6 lbs.	17.50
L405A	Abtax	6 lbs.	17.50

Note: The above controls supersede Types L105-1, L205-1, L405-1, L105-2, L205-2, and L405-2.

T11-R19 CONTROL PACKAGE

The combination T11 and R19 Regulator Package is particularly applicable for Automatic Coal Burner and Coal Blower applications. This package makes it possible to install the finest of low voltage equipment at a cost comparable to line voltage controls. The T11A Acratherm, incorporating the proven Heat Acceleration feature, combines accuracy, beauty and flexibility to give you the most modern room thermostat. The relay is the standard Series 10 R19A relay, having a single pole single throw switching function.

Type T11A Acratherm (Heat Accelerated).

Scale Range: 55 to 85° F. Factory Differential Setting: 3° F.

Type R19A Relay.

Switching Function: Single pole, Single throw. Load circuit common with supply circuit. (Standard.)

Removable link separates load circuit from supply circuit.

Current Rating: 10 amps., 110 volts; 5 amps., 220 volts. Motor Rating: 1 H.P., R.I.; 1/2 H.P., S.P.

Standard models 110 or 220 volts, 50 or 60 cycles. For 110 or 220 volt, 25 cycles, add \$4.00 list extra.

STOKERSWITCH

The Stokerswitch is designed to automatically control the operation of domestic and small automatic coal burners. The control is mounted in the stack, with the thermostatic element, protected by a monel metal shield, inserted therein.

If the stack temperature drops to the point at which the indicator is set, and this will normally occur only during mild weather when infrequent calls for heat are necessary, the "holdfire" feature comes into play and starts the coal burner, automatically, keeping it in operation long enough to prevent the fire from going out. Should the fire go out for any reason the "outfire cutoff" comes into play and stops the coal burner entirely, so that the fire box cannot be filled with green fuel.

A new feature prevents the stack temperature from reaching an excessive point and this not only increases the efficiency of automatic coal burner operation, but in addition limits the temperature to the safe working range of the control and prevents it from becoming inaccurate.

Type L105 (Series 10); Type L205 (Series 20) Stokerswitches.

Holdfire Range (adjustable) 135-335° F. Holdfire Differential (adjustable) 25-200° F.

Outfire Cutoff approximately 95°. High Limit Control (maximum allowable stack temperature) approx. 900° F.

Suitable for all stacks larger than 5".

Type L405 (Series 40) Stokerswitch for line voltage control.

Specifications same as L105. Current rating, 10 amps., 110 volts; 5 amps., 220 volts.

Motor rating, 3/4 H.P. R.I.; 1/4 H.P. S.P. or D.C.



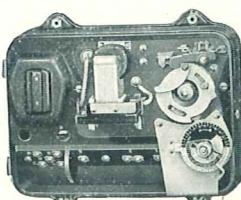
(PATENT NOTICE: These Holdfire controls carry with them a license to use this system of preventing extinguishment of the fire when operating under low heat requirement conditions as covered by Patent No. 1758147.)

TYPE	CODE	SHIP. WT.	LIST PRICE
L107A	Abtbx	1 lb.	\$12.00

HOLDFIRE CONTROLLER

The Holdfire Controller is designed to maintain a minimum fire in automatic coal burners on domestic and small industrial steam and hot water installations. This model is available for surface mounting. The coal burner is operated for a brief period whenever the water temperature falls to a predetermined degree. The differential is not adjustable and the operating period depends upon the rate of temperature rise in the boiler.

Type L107A (Series 10) Surface type, scale 100-200° F.



TYPE	CODE	SHIP. WT.	LIST PRICE
R153A	Begxk	9 lbs.	\$29.00
R154A	Lipxk	9 lbs.	35.00

TYPES R153A TIMERELAY AND R154A DA-NITE TIMERELAY

The Timerelay and Da-Nite Timerelay combine into a single compact unit, a thermostatically controlled relay and a simple synchronous timing mechanism which provides sufficient stoking to maintain the fire. The Da-Nite Timerelay offers in addition an automatic switching device to change from day to night temperature settings of a twin thermostat. An interlocking mechanism on the Timerelay makes it impossible to obtain a stoking operation immediately following a shut down from the room thermostat. In this event, the Timerelay skips an operation, and at times almost two operations—preventing over-shooting of room temperatures and eliminating fuel waste. Timing is fully adjustable from 1/2 minute to 7 1/2 minute periods at 30 or 60 minute intervals, as desired. The Timerelay is designed for single phase applications only.

Type R153A Timerelay (Series 10).

Factory Setting: 2 minutes operating period each 30 minutes.

Adjustable timing from 1/2 minute to 7 1/2 minutes at either 30 or 60 minute intervals.

Current Rating: 10 amps., 110 volts; 5 amps., 220 volts.

Motor Rating: Single phase 1 H.P. R.I.; 1/2 H.P. S.P. Standard Model: 110 volts, 60 cycle; for 220 volts, 60 cycle, add \$2.00 list extra. For 110 or 220 volt, 25 cycle, add \$6.00 list extra.

Not available for D.C.

Type R154A Da-Nite Timerelay (Series 10).

Same as R153A except for use with T19 Twin Acratherm.



minneapolis-honeywell regulator company

Automatic Coal Burner Controls—Damper Motors—Regulator Sets



TYPE	CODE	SHIP. WT.	LIST PRICE
R183A	Bemxk	6 lbs.	\$21.00

TYPE R183A STOKERELAY

The Type R183A Stokerelay combines into one single compact unit a thermostatically controlled relay and simple synchronous timing mechanism. It is designed for low voltage thermostatic control from the accurate and dependable Type T11 Acratherm. Timing is fully adjustable to cause stoker operations of from $\frac{1}{2}$ minute to $7\frac{1}{2}$ minutes, at thirty or sixty minute intervals, as desired. The contacts are of ample capacity and the terminal arrangement permits a separate load circuit if desired.

Type R183A (Series 80).

Thermostat must be "Series 10."

Factory setting: two minutes operating period each thirty minutes.

Adjustable timing from $\frac{1}{2}$ minute to $7\frac{1}{2}$ minutes at either thirty or sixty minute intervals.

Current rating: 10 amps., 110 volts; 5 amps., 220 volts.

Motor Rating: Single phase, 1 H.P. R.I., $\frac{1}{2}$ H.P. S.P.

Standard model—110 volt 60 cycle. For 220 volt 60 cycle add \$2.00 list extra. For 110 or 220 volt 25 cycle add \$6.00 list extra. Not available for D.C.



M26A Motor

TYPE	CODE	SHIP. WT.	LIST PRICE
M26A	Bcixk	8 lbs.	\$19.50
M26C	Bcjxk	10 lbs.	24.50

M26 MOTORS

These are small but efficient damper control motors, designed to meet conditions found on domestic damper control and zone control installations. It is similar in operation to the well-known D Motor, but has less power, and therefore cannot be used in excess of its rated load. As shown in the cut, it has two crank arms and a built-in switch for manual operation. Furnished with external transformer. Available with Series 20 dual control switch bracket and linkage for zone control applications—May be mounted on either circular or flat duct surfaces. Specify M26C.

Type M26A (Series 20).

Maximum lifting effort at end of crank arm 7 lbs. Standard models 110 volt, 50 or 60 cycle.

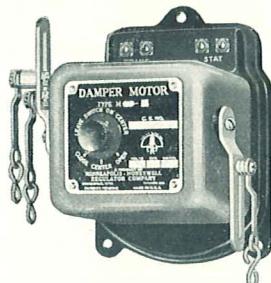
For other standard A.C. voltages and frequencies add \$2.00 list.

May be used with any Series 20 Thermostat for damper control.

Not available for D.C.

Type M26C (Series 20).

Equipped with Z564-1 mounting bracket and linkage for zone damper control. Equipped with series 20 dual control Switch—suitable for controlling series 20 motors or series 10 relays. Mounted on large base.



TYPE	CODE	SHIP. WT.	LIST PRICE
M87A	Bckxk	8 lbs.	\$22.50

M87A SPRING RETURN DAMPER MOTOR

A small but efficient damper motor for two position operation of dampers. Motor provides for normal opening in response to controller and closing either in response to controller or due to interruption of current supply. A powerful spring assures position return to closed position upon power failure. The M87A Motor is available for two wire low voltage control. External transformer is supplied.

Type M87A (Series 80) two wire low voltage.

May be used with any two wire low voltage controller.

Maximum lifting load at rated voltage 29 lbs. at end of 2-11/16" radius.

External coil spring operates the motor on normal closing cycle or upon power failure.

Standard model 110 volts 50 or 60 cycle. For other A.C. voltages and frequencies add \$2.00 list.

Not available for D.C.

Package Regulator Sets



TYPE	CODE	SHIP. WT.	LIST PRICE
Standard Electric Janitor			
Y100A	Etlxk	12 lbs.	\$28.50
Da-Nite Electric Janitor			
Y18A	Pkwxk	11 lbs.	38.50
Electric Clock Deluxe Janitor			
Y17A	Pljxk	13 lbs.	60.50

THE ELECTRIC JANITOR

The Electric Janitor is an all electric control for regulating the operation of dampers on domestic coal fired heating plants of all types. Through the automatic regulation accurate room temperatures are maintained. The motor unit is the efficient M26A motor described above. The Standard Electric Janitor Package pictured at the left, includes the new T21 Heat Leveling Thermostat. The Da-Nite Electric Janitor includes the T209 Da-Nite Thermostat. This combination offers the advantages of lowered night temperature with automatic return to day time level in the morning—simply requiring a "twist of the wrist" to set. The Electric Clock Deluxe Janitor Package includes the T205 Chronotherm which incorporates the Heat Leveling feature, enabling a uniform leveled temperature to be maintained. This thermostat is completely automatic and provides for automatic lowering of the indicator setting during the night, with automatic return to the day time setting each morning. All three sets are complete with fittings.

Control Circuit: Series 20. Operating Range: 55 to 85° F. Maximum Motor Load: 7 lbs. at end of arm. Standard Model 110 volts, 50 or 60 cycles, for other A.C. voltages and frequencies add \$2.00 list.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Package Regulator Sets



TYPE	CODE	SHIP. WT.	LIST PRICE
Y101A	Etmxk	12 lbs.	\$31.50



TYPE	CODE	SHIP. WT.	LIST PRICE
Y1A	Pkexk	12 lbs.	\$36.50



TYPE	CODE	SHIP. WT.	LIST PRICE
Y2A	Pkfxk	13 lbs.	\$39.50



TYPE	CODE	SHIP. WT.	LIST PRICE
Y3A	Pkgxk	18 lbs.	\$47.50



TYPE	CODE	SHIP. WT.	LIST PRICE
Y4A	Pkhxk	17 lbs.	\$45.50

HEAT LEVELING SPRING RETURN ELECTRIC JANITOR

This new Electric Janitor set, designed for controlling the operation of domestic coal-fired heating plants, assures accurate automatic temperature control. The sturdy M87A Spring Return motor positions the dampers in response to the demands of the room thermostat. In addition a powerful spring returns the damper to the checked position upon power failure. This safety feature prevents overheating during a prolonged current interruption. The set includes the T45 Heat Leveling Thermostat which assures a constant leveled temperature. The necessary fittings are packed with each set.

Series 80—2-wire low voltage. Scale Range: T45—55-85° F.

Maximum motor load 29 lbs. at end of 2-11/16" arm.

Standard models 110 volts 50 or 60 cycles.

For other A.C. voltages and frequencies add \$2.00 list. Not available for D.C.

WARM AIR CONTROL SYSTEM Y1 (Coal or Coke Hand Fired—Gravity)

This control system is a new and entirely different development in the regulation of coal or coke fired gravity heating plants. It offers an extremely accurate means of room temperature control from a single thermostat.

The thermostat, which is the new Heat Leveling Type T21, controls the damper motor causing it to open and close check and draft dampers. A safety controller—the Airstat—is included to check the fire when bonnet temperatures become excessive.

Type T21 Thermostat

Scale Range: 55 to 85° F.

Factory Differential Setting: 1½° F.

Finish: Silver.

Type L219 Airstat

Scale Range: 50-350° F.

Suggested Setting: 250-275° F.

Operating Differential: 25-50° F.

Element Extension: 5½".

Current Rating: 3 amps. at 20 volts.

Type M26A Damper Motor

Timing: Approx. 60 seconds per operation.

Maximum lifting effort at end of crank arm: 7 lbs.

Maximum torque at shaft: 18 inch lbs.

WARM AIR CONTROL SYSTEM Y2 (Coal or Coke Hand Fired—Gravity)

This control system is a new and unusual method of regulating coal or coke fired gravity heating plant. It automatically checks the fire in case of line voltage failure, and offers an extremely accurate means of room temperature control from a single thermostat.

The thermostat, which is of the heat leveling type, controls the damper motor, causing it to open and close check and draft dampers. A safety controller—the Airstat—is included to check the fire when bonnet temperatures become excessive. An interruption of electrical current to the heating system will cause the fire to be checked.

Type T45 Thermostat

Scale Range: 54-86° F.

Adjustable Differential: 1½ to 6° F.

Current Rating: 5 amps. at 110 volts; 2½ amps. at 220 volts.

Finish: Silver.

Type L419 Airstat

Scale Range: 50-350° F.

Suggested Setting: 250-275° F.

Operating Differential: 25-50° F.

Element Extension: 5½".

Current Rating: 10 amps. at 110 volts; 5 amps. at 220 volts.

Type M87 Damper Motor

Timing: Approx. 25 seconds for 60° power stroke.

Maximum lifting effort at 110 volts at 2-11/16" radius: 29 lbs.

WARM AIR CONTROL SYSTEM Y3 (Coal or Coke Hand Fired—Bonnet Control of Blower)

This control system, designed especially for use with a coal or coke fired, mechanical warm air heating system, provides satisfactorily close regulation on many heating plants at a very moderate cost. The blower is controlled solely from the bonnet temperatures, and the fire directly by the room thermostat.

The thermostat, which is the Heat Leveling Type T21, controls the damper motor, causing it to open and close check and draft dampers. As soon as the air in the bonnet of the furnace is warm enough, the Furnacestat will allow the blower to operate to deliver heat to the rooms, and stop when the bonnet temperature cools. A safety controller—the Airstat—is included to check the fire when bonnet temperatures become excessive.

Type T21 Thermostat

Scale Range: 55 to 85° F.

Factory Differential Setting: 1½° F.

Finish: Silver.

Type L219 Airstat

Scale Range: 50-350° F.

Suggested Setting: 250-275° F.

Operating Differential: 25-50° F.

Element Extension: 5½".

Current Rating: 10 amps. at 110 volts; 5 amps. at 220 volts.

Type L412A Furnacestat

Scale Range: 100-300° F.

Operating Differential: 15-45° F.

Element Extension: 9-14½".

Current Rating: 10 amps. at 110 volts; 5 amps. at 220 volts.

Type M26A Damper Motor

Timing: Approx. 60 seconds per operation.

Maximum lifting effort at end of crank arm: 7 lbs.

Maximum torque at shaft: 18 inch lbs.

WARM AIR CONTROL SYSTEM Y4 (Coal or Coke Hand Fired—Bonnet Control of Blower)

This control system, designed especially for use with a coal or coke fired, mechanical warm air heating system, provides satisfactorily close regulation on many heating plants. It is used as a combination blower and limit controller—consequently, is extremely moderate in price. The blower is controlled solely from bonnet temperatures—the fire by the room thermostat.

The thermostat and damper motor are the same as in System Y3. The Combination Furnace Controller allows the fan to operate when the proper bonnet temperature is reached.

Type T21 Thermostat

Scale Range: 55 to 85° F.

Factory Differential Setting: 1½° F.

Finish: Silver.

Type L201A Combination Controller

Scale Range: 50-175° F.

Operating Differential: 20-40° F.

Element Extension: 10-15".

Current Rating: 3 amps. at 20 volts.

Type M26A Damper Motor

Timing: Approx. 60 seconds per operation.

Maximum lifting effort at end of crank arm: 7 lbs.

Maximum torque at shaft: 18 inch lbs.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Package Regulator Sets



TYPE	CODE	SHIP. WT.	LIST PRICE
Y5A	Pkixk	19 lbs.	\$50.50

WARM AIR CONTROL SYSTEM Y5 (Coal or Coke Hand Fired—Bonnet Control of Blower)

This control system, providing protection for the heating plant from possible damage by over-heating when the electrical supply is interrupted, is especially designed to offer a moderately priced system for a coal or coke fired, mechanical warm air heating plant. Blower control is from bonnet temperatures.

Safety features in a heating system are highly desirable. A safety controller—the Airstat—is included to check the fire when bonnet temperatures become excessive. An interruption of electrical current to the heating system will cause the fire to be checked.

Type T45 Thermostat

Scale Range: 54-86° F.
Adjustable Differential: 1½ to 6° F.
Current Rating: 5 amps. at 110 volts; 2½ amps. at 220 volts.
Finish: Silver.

Type L419 Airstat

Scale Range: 50-350° F.
Operating Differential: 25-50° F.
Element Extension: 5½".
Current Rating: 10 amps. at 110 volts; 5 amps. at 220 volts.

Type L412A Furnacestat

Scale Range: 100-300° F.
Operating Differential: 15-45° F.
Element Extension: 9-14½".
Current Rating: 10 amps. at 110 volts; 5 amps. at 220 volts.

Type M87 Damper Motor

Timing: Approx. 25 seconds for 60° power stroke.
Maximum lifting effort at 110 volts at 2-11/16" radius: 29 lbs.



TYPE	CODE	SHIP. WT.	LIST PRICE
Y6A	Pkjxk	18 lbs.	\$48.50

WARM AIR CONTROL SYSTEM Y6 (Coal or Coke Hand Fired—Bonnet Control of Blower)

This control system is especially designed for a mechanical warm air heating system—coal or coke fired. The spring return damper motor used in this system will protect the heating plant in case electrical current fails. The combination blower and limit controller makes possible a very moderate price for the system.

The thermostat, which is of the Heat Leveling type, controls the damper motor, causing it to open and close check and draft dampers. As soon as the air in the bonnet of the furnace is warm enough the Combination Furnace Controller will allow the blower to operate to deliver heat to the rooms, and stop when the bonnet temperature cools.

Type T45 Thermostat

Scale Range: 54-86° F.
Adjustable Differential: 1½ to 6° F.
Current Rating: 5 amps. at 110 volts; 2½ amps. at 220 volts.
Finish: Silver.

Type L101A Combination Furnace Controller

Scale Range: 50-175° F.
Operating Differential: 20-40° F.
Element Extension: 10-15".
Current Rating: 10 amps. at 110 volts and 5 amps. at 220 volts.

Type M87 Damper Motor

Timing: Approx. 25 seconds for 60° power stroke.
Maximum lifting effort at 110 volts at 2-11/16" radius: 29 lbs.



TYPE	CODE	SHIP. WT.	LIST PRICE
Y7A	Pklxk	20 lbs.	\$66.00

WARM AIR CONTROL SYSTEM Y7 (Coal or Coke Hand Fired—Thermostat Control of Blower)

This control system, unique and distinctive because of its many unusual features, provides exceptionally fine comfort-creating control all year around when used with a domestic, coal or coke fired, mechanical, warm air heating plant.

The thermostat and damper motor are the same as in System Y3. The Air Conditioning Furnacestat allows the fan to operate when the proper bonnet temperature is reached.

Type T21 Thermostat

Scale Range: 55 to 85° F.
Factory Differential Setting: 1½° F.
Finish: Silver.

Type L30B Air Conditioning Furnacestat

Scale Range: 100-175° F.
Operating Differential: Fan—20-40° F.; Limit—30-50° F.
Element Extension: 10-14½".
Current Rating: 3 amps. at 20 volts for limit switch; 10 amps. at 110 volts and 5 amps. at 220 volts for fan switch.

Type M26A Damper Motor

Timing: Approx. 60 seconds per operation.
Maximum lifting effort at end of crank arm: 7 lbs.
Maximum torque at shaft: 18 inch lbs.



TYPE	CODE	SHIP. WT.	LIST PRICE
Y8A	Pkmxk	20 lbs.	\$69.00

WARM AIR CONTROL SYSTEM Y8 (Coal or Coke Hand Fired—Thermostat Control of Blower)

This control system is the same as Control System Y7 except that the heating plant will be protected from dangerous temperatures that might result if the controls ceased operating, due possibly to a blown fuse or a current failure. This system offers a definite program for control of heating plant and fan for close and accurate regulation of room temperatures. It is particularly designed to minimize the discomforting effect of air stratification.

Type T21 Thermostat

Scale Range: 55-85° F.
Factory Differential Setting: 1½° F.
Finish: Silver.

Type L30A Air Conditioning Furnacestat

Scale Range: 100-175° F.
Operating Differential: Fan—20-40° F.; Limit—30-50° F.
Element Extension: 10-14½".
Current Rating: 3 amps. at 20 volts for limit switch; 10 amps. at 110 volts and 5 amps. at 220 volts for fan switch.

Type M87 Damper Motor

Timing: Approx. 25 seconds for 60° power stroke.
Maximum lifting effort at 110 volts at 2-11/16" radius: 29 lbs.



TYPE	CODE	SHIP. WT.	LIST PRICE
Y12A	Pkoxk	25 lbs.	\$47.00

WARM AIR CONTROL SYSTEM Y12 (First or Basic Zone System)

Frequently a forced warm air heating system cannot properly heat a structure because the exposure, size, usage or physical arrangements of the building, are such that outside weather conditions do not affect all parts of the building alike. Then again it is often desirable to maintain various temperatures in several parts of the building—such as the bedroom, living room and others rooms—at the same time. Under such requirements, a zone heating layout is desirable, and the duct system installed accordingly.

Zone Control System Y12 contains all the equipment necessary for the first zone, including the thermostat, damper motor, linkage to connect the motor to the damper, and a power box with terminal strip for a common wiring center for the entire system. Since the power box has a capacity for four zones, one first zone should be specified for each four zones in the complete system.

Type T21 Thermostat

Scale Range: 55-85° F.
Factory Differential Setting: 1½° F.
Finish: Silver.

Type W1 Power Box

Terminal Panel Assembly.
Space for Mounting Four Motor Transformers.

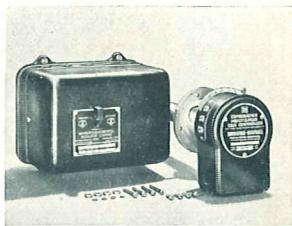
Type M26C Damper Motor

Timing: Approx. 60 seconds per operation.
Maximum lifting effort at end of crank arm: 7.85 lbs.
Equipped with "Series 20" Dual Control Switch.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Package Regulator Sets—Boiler Regulators



TYPE	CODE	SHIP. WT.	LIST PRICE
Warm Air Control System			
Y46A1	Nathk	13 lbs.	\$48.00
Y47A1	Natik	13 lbs.	48.00
Y48A1	Natjk	13 lbs.	48.00

WARM AIR CONTROL SYSTEMS Y46, Y47 AND Y48

These control systems offer reliable regulation of two-speed fans, operating in automatically fired mechanical warm air heating plants. Desired conditions are obtained by coordinating the operation of the circulating fan with the operation of an oil, gas, coal or coke fired burner.

When the temperature in the bonnet of the furnace has reached the indicator setting, the Combination Multispeed Fan Controller will start the fan on low speed. When the bonnet temperature has reached a point adjustable from 20° to 40° F. above the cut-in point of low speed fan operation, the Combination Multispeed Fan Controller will turn the fan on to high speed.

When the required room temperature is reached, the fan will return to low speed and continue in low speed until the bonnet temperature drops the amount of the set differential, adjustable from 20° to 40° F., below the cut-in point of low speed fan operation.

During the summer, the fan will operate at high speed whenever the room temperature mounts above the setting of the thermostat indicator.

The relay is the same in all three control systems but Type L121 Combination Multispeed Fan Controller is included with system Y46A, Type L221 with system Y47A and Type L421 with system Y48A.

Combination Multispeed Fan Controller

Scale Range: 50-175° F.

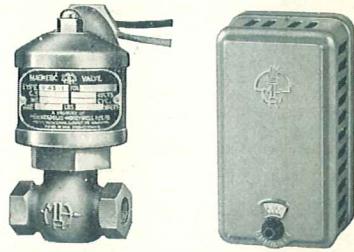
Operating Differential: 20-40° F.

Element Extension: 10-15".

Current Rating: 10 amps. at 110 volts and 5 amps. at 220 volts.

Type R156 Relay

Available for A.C.



TYPE	CODE	SHIP. WT.	LIST PRICE
Y19A	Etjxk	20 lbs.	\$25.50

HUMIDITY CONTROL SYSTEM

The Humidity Control Package provides a complete humidity control system applicable to the average forced warm air heating system on which adequate humidifying equipment is provided. The H41A humidity controller reacts to the elongation or contraction of the sensitive hydroscopic element assuring constant humidity conditions. The V43-1 water valve is a quiet line voltage solenoid valve with replaceable seat and plunger.

Standard package 110 volts 50 or 60 cycles. For other A.C. voltages and frequencies and for D.C. add \$2.00 list.

H41A Humidity controller (without indicator).

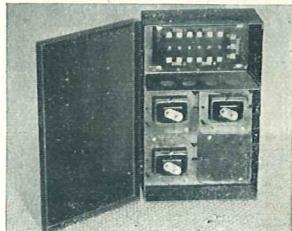
Scale Range: 20 to 80% Relative Humidity. Differential: 2 to 3%.

Series 40—2-wire line voltage. Current rating: 2 amps., 110 volts; 1 amp., 220 volts.

V43-1 Water Valve.

Series 40—two-wire line voltage. Tapped for $\frac{3}{8}$ " pipe size; port opening, $\frac{1}{8}$ ".

Maximum water pressure: 150 lbs. per square inch. Flow .77 gallons per minute at 2 lbs. pressure drop.



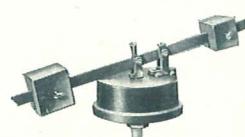
TYPE	CODE	SHIP. WT.	LIST PRICE
W1-1 Power Box	Etixk	8 lbs.	\$13.50

TYPE W1-1 POWER BOX

(Four Zone)

The Type W1-1 Power Box consists of a specially designed wall mounted control panel, in which all of the zone damper motor transformers may be mounted and connected to a single line voltage supply line. Terminals are provided for the wiring from the auxiliary switches on the zone motors, and these terminals are cross connected behind the terminal strip in such a way that either Series 10 or Series 20 control equipment may be operated by auxiliary switches. This wiring provides for the operation of the heat producing equipment upon a demand by any zone as indicated by the closing of the auxiliary switch on the corresponding zone damper motor. No transformers are provided with the power box since the transformers are furnished with each control motor. Blank plates are furnished to take the place of the transformers when the full capacity of the box is not needed.

Boiler and Furnace Regulators



TYPE	CODE	SHIP. WT.	LIST PRICE
M500A	Acqhx	12 lbs.	\$ 6.00
M500B	Acqix	13 lbs.	7.50
M500C	Acqjx	20 lbs.	9.00
M500D	Acqkx	40 lbs.	15.00
M500E	Acqlx	51 lbs.	20.00

The Steam and Vapor Regulators are self-contained motors operating entirely on boiler pressures of fifteen pounds or less by attachment direct to the boiler. These regulators are designed to give proper damper regulation on steam, vapor and vapor-vacuum systems.

The boiler dampers are operated by an external lever on the Steam and Vapor Regulator which in turn is governed by an increase or decrease of pressure within the Metaphrums of the regulator.

M500A limited lift regulator for small steam boilers.

M500B normal lift regulator for small steam boilers.

M500C for medium to large sized steam boilers.

M500D for small vapor and vacuum systems and large steam systems.

M500E for medium to large vapor and vacuum systems and large steam systems.

Closes draft damper and opens check damper on a rise in pressure.

Steam pressure: 0-15 pounds.

Pipe sizes: $\frac{3}{4}$ " for Types M500A, M500B and M500C; 1" for all types.

The size of a damper regulator depends upon the closeness of regulation desired and also the weight of the dampers. Finish: Black.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Boiler and Furnace Regulators—Circulators and Flow Valves—Humidity

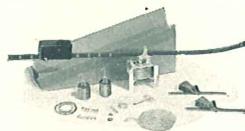


TYPE	CODE	SHIP. WT.	LIST PRICE
M501A	Acqmx	14 lbs.	\$11.50
M502A	Acqnx	13 lbs.	8.50
M503A	Acqox	14 lbs.	8.00

HOT WATER REGULATOR

The Hot Water Regulator is a self-contained motor operating entirely on water temperatures by insertion in the boiler. The Hot Water Regulator is designed to give proper damper regulation on hot water heating systems and hot water tanks.

The boiler dampers are operated by an external lever on the Hot Water Regulator which in turn is governed by an increase or decrease of temperature surrounding the sensitive element of the regulator. **M501A** for two inch tappings. **M502A** for one inch tappings. **M503A** for hot water tanks. Closes draft damper and opens check damper on a rise in pressure. Finish: Black.



TYPE	CODE	SHIP. WT.	LIST PRICE
M504A	Acqpx	10 lbs.	\$8.00

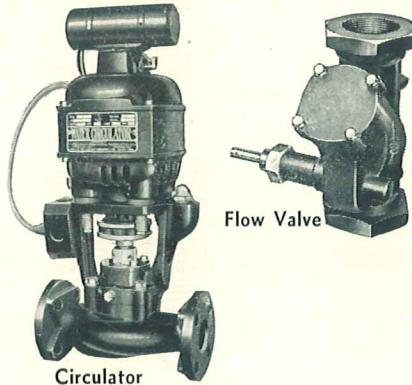
WARM AIR REGULATOR

The Warm Air Regulator is a self-contained motor attached direct to the furnace, operating on bonnet temperature changes—by basement and return air temperatures, both affected by outside temperatures. The Warm Air Regulator is designed to give proper damper regulation on warm air furnaces.

The warm air dampers are operated by an external lever on the Warm Air Regulator which in turn is governed by an increase or decrease of temperatures surrounding the Metaphrams of the regulator. **M504A** for all types of return warm air furnaces.

Closes draft damper and opens check damper on a rise in temperature. Lever: Split with 21" for each section. Finish: Aluminum and Cadmium.

Circulators and Flow Valves



TYPE	CODE	SHIP. WT.	LIST PRICE
M402-2 Circulator			
1"	Nczxk	63 lbs.	\$44.00
1 1/2"	Ncuxk	65 lbs.	50.00
2"	Ncyxk	77 lbs.	56.00
M401-3 Circulator			
3"	Ncixk	170 lbs.	68.00
M401-4 Circulator			
3"	Pcgxk	175 lbs	94.00

CIRCULATORS AND FLOW VALVES

These circulators are used to speed up circulation on hot water heating systems. They may be used alone for this purpose or in conjunction with the Type V561 Flow Valves to provide fully automatic Summer-Winter Hot Water Control. The rise and fall of pressure induced by the starting and stopping of the circulator under thermostatic control causes the Flow Valves to open and close off respectively, the water circulation to the heating system. Thus room temperature is held at a uniform level and the boiler burner is used the year around for supplying domestic hot water.

Circulators are all provided with quiet capacitor motors and for flange connections—companion flanges, bolts and gaskets included.

Type M402 Circulators.

M402-2—1", 1 1/2", 1/2 H.P., direct drive, 2", 1/6 H.P., direct drive.
M401-3—3", 1/4 H.P. belt drive type with 3" impeller.
M401-4—3", 1/2 H.P. belt drive type with 4" impeller.

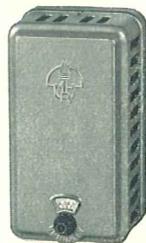
Type V561 Flow Valves.

V561-1—1", 1 1/2", and 2" with screw connections.
V561-2—3" with flange connections; 4" with flange connections.

Companion flanges, bolts and gaskets included.

TYPE	CODE	SHIP. WT.	LIST PRICE
V561-1 Flow Valve			
1"	Zanxk	14 lbs.	4.50
1 1/2"	Zabxk	14 lbs.	7.50
2"	Zacxk	17 lbs.	9.00
V561-2 Flow Valve			
3"	Zadxk	42 lbs.	17.00
4"	Zaexk	62 lbs.	22.00

Humidity Controllers



HUMIDITY CONTROLLERS

These controllers are available in compact room type instruments. Humidity function is provided by elongation and contraction of human hair hydroscopic element which operates a mercury switch. Models are available for regular or reverse acting two wire (Series 40) or three wire (Series 60) mercury switches. All models available with or without visible relative humidity indicators. Sprayed silver finish is standard but bronze finish available on order at no extra charge.

Setting range: Humidity 20-80%; Diff. 2 to 3%.

HUMIDITY CONTROLS

Type H41; 2 wire Series 40; capacity 3 amps. at 20V., 2 amps. at 110, 1 amp. at 220, 1/12 H.P., R.I., or 1/20 H.P. S.P. or D.C.

Type H61; 3 wire Series 60; capacity 3 amps. at 20V., 1 amp. at 110, 1/2 amp. at 220, 1/12 H.P., R.I., or 1/20 H.P. S.P. or D.C.

SPECIFY WHEN ORDERING

Controller with or without humidity indicator, type of mercury switches, i. e., two wire or three wire and whether humidity controller is for humidification or dehumidification.

TYPE	CODE	SHIP. WT.	LIST PRICE
H41A without humidity indicator			\$16.00
H41A with humidity indicator			22.00
H61A without humidity indicator			16.00
H61A with humidity indicator			22.00

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Solenoid Water Valves—Motorized Flow Valves—Refrigeration Control



WATER VALVES

The Type V43-1 and V83-1 are silent solenoid valves with replaceable seat and plunger especially designed for domestic air washers.

Available in straight through pattern only (standard models 110-volt, 50 and 60 cy.).

Type V43-1—For other voltages and frequencies or for D.C., add \$2.00 list.

Type V83-1—For two wire low voltage applications equipped with external transformer. Not available for D.C. For other A.C. voltages and frequencies add \$2.00 list.

Tapped for $\frac{3}{8}$ " pipe size; port opening, $\frac{1}{8}$ ". Maximum water pressure, 100 lbs. per sq. in.

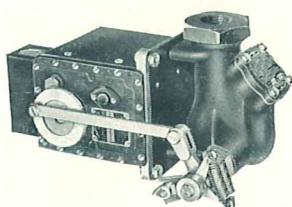
$\frac{1}{2}$ " conduit connection. When open draws approx. 12 watts.

Flow—.77 gal. per min. at 2 lbs. pressure drop, 2.83 gal. per min. at 75 lbs. pressure drop, 3.29 gal. per min. at 100 lbs. pressure drop.

Not recommended for automatic boiler feeder use or for refrigerant flow control.

TYPE	CODE	SHIP. WT.	LIST PRICE
V43-1	Vfuxk	4 lbs.	\$ 9.50
V83-1	Vfaxk	5 lbs.	12.50

Motorized Flow Valves



TYPE K204 MOTORIZED FLOW VALVE

This valve is widely used with a low voltage thermostat to control the flow of hot water in gravity hot water installations using Summer-Winter control systems. The power unit for this valve is the M204A Motor which is of the shaded pole induction type. A dual control switch can be supplied to control the operation of a second motorized valve.

V562-1 FLOW VALVE FOR TANDEM INSTALLATION

On installations requiring more than one valve but where one motor can operate two or more valves through suitable linkage, the V562-1 Flow Valve is available. The V562-1 is identical to the K204 except that the motor is omitted. To obtain the list price of the V562, deduct \$38.00 from the list price of the corresponding V261.

Patent Notice: Our Type K204 Motorized Flow Valve carries with it a license to use the combined hot water house heating and domestic water-heating systems, under patent No. 1533630.

TYPE	CODE	SHIP. WT.	LIST PRICE
K204 Flow Valve			
Screwed	1"	Lbadk	\$51.50
	1½"	Lbafk	54.50
	2"	Lbagk	56.00
Flanged	3"	Lbahk	64.00
	4"	Lbjk	69.00



TYPE T491A AIRSWITCH

The Type T491A (149) Airswitch is used as a controller to regulate the temperature in florist cabinets, butcher cases, cooler rooms, and similar applications. It is also used as a limit controller where it is necessary to prevent dangerously low temperatures, such as in florist cases. It can withstand extreme conditions of temperature and humidity. It is equipped with a mercury switch which is tilted by the contraction or expansion of the non-corrosive bi-metal strip to make and break the circuit. Equipped with locking device and differential adjustment.

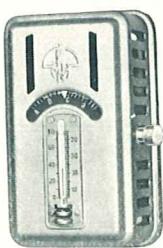
Type T491A (2-wire).

Elec. Rating: 8A., 110V.; 4A., 220V.

Motor Rating: 110-250V. A.C., $\frac{1}{3}$ H.P. R.I., 1/6 H.P. S.P. and D.C.

Operating Range: 15° to 95° F.—Diff. Adjustable 3° to 8°. Finish: Aluminum.

TYPE	CODE	SHIP. WT.	LIST PRICE
T491A (149)	Acfkx	4 lbs.	\$13.50



TYPE T420A FRIGISTAT

The Frigistat is an attractive refrigeration controller, similar in design to the Type T42 Thermostat, for use in refrigerated spaces such as meat packing boxes, florist cabinets, etc. The internal metal parts and the screen are especially plated making them rust proof and resistant to corrosive atmospheres. A thermometer is furnished on the face of the instrument. Designed particularly for pilot duty.

Type T420A Frigistat (Series 40) closes circuit on temperature rise.

Electrical Rating: 2 amperes at 110 volts, 1 ampere at 220 volts.

Operating Range: 30-65° F.

Scale Markings: A, B, C, D.

Differential: 2-3° F.

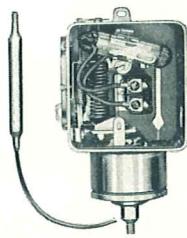
Finish: Aluminum.

TYPE	CODE	SHIP. WT.	LIST PRICE
T420A	Acwcx	3 lbs.	\$11.00



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Refrigeration Controllers



TYPE CODE SHIP. WT. LIST PRICE

T414A Abqnx 5 lbs. \$12.60
(with 6 ft. tubing and range of —10 to +50° F.)

T414A Abqox 5 lbs. 12.90
(with 10 ft. tubing and range of —10 to +50° F.)

Specify range and element length.
Range +15 to +90° available \$1.00 list extra.

T414 REFRIGERATION TEMPERATURE CONTROLLER (Heavy Duty)

This unit is a bulb temperature controller designed to provide remote control for refrigerating equipment such as freezer cabinets, butcher cases, milk coolers, water coolers, etc., where it is not practical to place a thermostat. A change in temperature produces a pressure in the bulb which is transmitted by a capillary cable to the metal bellows. The resultant expansion or contraction of the bellows tilts the mercury switch to make or break the circuit.

Type T414.

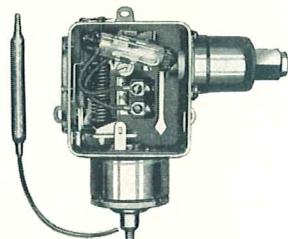
Available in three standard ranges: —50 to +10° F.; —10 to +50° F.; +15 to +65° F.
Differential: Oper. point set at min. 2 to 3° F.; oper. point set at max. 12 to 15° F.

Electric Rating: 110-125V. 200-250V.
R.I. Motor 1½ H.P. 2 H.P.
D.C. Motor ¾ H.P. 1 H.P.

Finish: Heavy Cadmium Plate.

All models furnished standard with either 6 or 10 ft. thermal elements.

Available with special length elements, 15 ft. or 20 ft. on order at \$2.00 extra list price.



TYPE CODE SHIP. WT. LIST PRICE

T413A Abpnx 5 lbs. \$18.40
(with 6 ft. cable, scale range of —10 to +50° F., and pressure range of 150-180 lbs.)

T413A Abpox 4 lbs. 18.70
(with 10 ft. cable, scale range of —10 to +50° F., and pressure range of 150-180 lbs.)

Specify range, element length and high-pressure cut-out.
Range +15 to +90° available \$1.00 list extra.

T413 REFRIGERATION TEMPERATURE CONTROLLER WITH HIGH PRESSURE CUT-OUT (Heavy Duty)

The Type T413 Refrigeration Temperature Controller is identical with Type T414 except that it incorporates a high pressure cut-out to shut down the compressor in case of excessive high pressures. The high pressure cut-out actuates the same mercury switch that is operated by the temperature element. For use with Sulphur Dioxide, Methyl Chloride and F12 Compressors only.

Type T413 (2-wire line voltage).

For Electrical Ratings see Type T414.

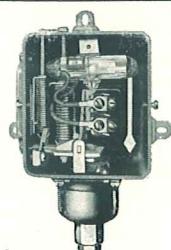
Available with Temperature Ranges of —50 to +10° F., —10 to +50° F., +15 to +65° F.

Minimum Temp. Differential: 2-3°, Max. 12-15° F.

Available for High Pressure Ranges of 110-135 lbs., 150-180 lbs., 185-220 lbs. adjustable within each of these ranges.

High Pressure Cut-out Differentials: 25, 30, 50 lbs. respectively, not adjustable.

Available with 15 ft. or 20 ft. temperature element on special order at \$2.00 list price extra. Specify pressure and temperature ranges and length of element desired.



TYPE CODE SHIP. WT. LIST PRICE

L414A Achax 4 lbs. \$10.60

L414A REFRIGERATION PRESSURE CONTROLLER (Heavy Duty)

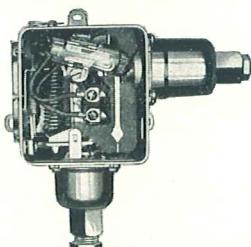
This controller is designed to regulate the operation of refrigerating machines through control of the suction or low side pressure. It starts the compressor with a rise in pressure and stops it with a fall in pressure. For use on Sulphur Dioxide, Methyl Chloride or F12 Compressors only.

Type L414A (2-wire line voltage).

Range: 22" vacuum to 35 lbs. pressure.

Differential Adj.: Max., 25-30 lbs.; Min., 4" vacuum at 22" vacuum, 2 lbs. at 0 pressure, 3 lbs. at 35 lbs. pressure.

For electrical ratings see Type T414.



TYPE CODE SHIP. WT. LIST PRICE

L413A Acgwx 4 lbs. \$16.40
Standard Models

L413A REFRIGERATION PRESSURE CONTROLLER WITH HIGH PRESSURE CUT-OUT (Heavy Duty)

The Type L413A Refrigeration Pressure Controller is identical with Type L414A except that it is provided with a high pressure cut-out. Operating normally from low side pressure, the high pressure cut-out steps in only when dangerous high side pressure requires that the compressor be stopped. For Sulphur Dioxide, Methyl Chloride and F12 Compressors only.

Type L413A (2-wire line voltage).

Low Side Pressure Range: 22" vacuum to 35 lbs. pressure.

Pressure Diff. Adj.: Max., 25-30 lbs.; Min., 4" vacuum at 22" vacuum, 2 lbs. at 0 pressure, 3 lbs. at 35 lbs. pressure.

Available in 3 high pressure cut-out ranges: 110-135 lbs., 150-180 lbs., 185-220 lbs. adjustable within each of these ranges.

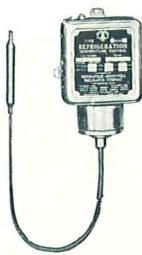
High Pressure Cut-out Diff.: 25, 30, 50 lbs. respectively—not adjustable.

Electrical Ratings same as T414. When ordering specify H.P. cut-out range desired.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Refrigeration—Temperature Controllers—Mercury Switches



TYPE	CODE	SHIP. WT.	LIST PRICE
L426A (6' cable)	Actmx	4 1/2 lbs.	\$11.20
L426A (10' cable)	Actnx	4 1/2 lbs.	11.50
L427A (6' cable)	Actvx	5 lbs.	16.40
L427A (10' cable)	Actwx	5 lbs.	16.70

Type L426 (Series 40)

Scale Ranges: -20 to +50° F., and 15 to 65° F.

Differential: 3 1/2°-15° F., at low point; 3°-13° F. at mid-scale; and 2 1/2°-12° F., at high point.

Motor Rating: 3/4 H.P. R.I. and 1/4 H.P. S.P. and D.C.

Finish: Cadmium—Zinc.

All models furnished standard with either 6 or 10 ft. thermal elements.

Available with special length elements, 15 ft. or 20 ft. on order at \$2.00 extra list price.

Type L427 (Series 40)

Available for high pressure ranges of 150-180 lbs., and 185-220 lbs., adjustable within each of these ranges.

High Pressure Differentials: 30 to 50 lbs. respectively, not adjustable.

Otherwise same specifications as for Type L426.

Specify range, element length and high pressure cut-out.

Range +15 to +65° F. available \$1.00 list extra.

TYPES P400 AND P401 REFRIGERATION PRESSURE CONTROLLERS (Light Duty)

The Types P400 and P401 are inexpensive, light duty refrigeration controllers of 3/4 horsepower or less. These controllers are designed to regulate the operation of refrigerating machines through control of the suction or low side pressure. It starts the compressor with a rise in pressure and stops it with a fall in pressure. For use on Sulphur Dioxide, Methyl Chloride or F12 Compressors only. The Type P401 is identical to Type P400 except that it is provided with a high pressure cut-out.

Type P400A (Series 40)

Scale range: 22" vacuum to 35 lbs.

Differential: 4" vacuum at low point, 2 lbs. at 0 pressure on mid-scale and 3 lbs. at high point.

Motor Rating: 3/4 H.P. R.I. and 1/4 H.P. S.P. and D.C.

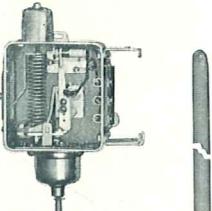
Finish: Cadmium—Zinc.

Type P401A (Series 40)

Available for high pressure ranges of 150-180 lbs., and 185-220 lbs., adjustable within each of these ranges.

High pressure cut-out differentials: 25, 30 and 50 lbs., respectively, not adjustable.

Temperature Controllers



TYPE	CODE	SHIP. WT.	LIST PRICE
T415A		5 lbs.	
T615A		5 lbs.	
0° to 70° F., 15° to 90° F. or 60° to 100° F., 65° to 140° F., 105° to 220° F.			\$16.50
160° to 280° F. or 240° to 385° F.			18.50
370° to 530° F. or 510° to 700° F.			29.50

Type T415 (Series 40), 2-wire

Current Rating: 10A., 110V.; 5A., 220V. Motor Rating: 3/4 H.P. R.I., 1/4 H.P. S.P. or D.C.

Type T615 (Series 60), 3-wire

Current Rating: 1A., 110V.; 1/2A., 220V.

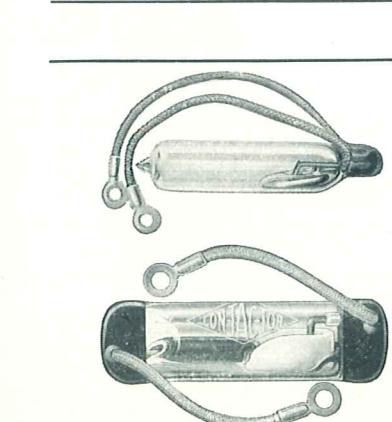
Type T915 (Series 90) Potentiometer type for use with Modutrol or proportioning motors and for compensated or effective temperature control—write for details.

Approximate Differentials: 3° to 12° max.

Standard instrument equipped with 6 ft. flexible tubing and pressure fitting. Size of capsule varies with temperature range.

Available with extra length flexible tubing, prices on request.

A supersensitive instrument can be furnished where close control of temperature is required. Information on request.



Request for Prices and Detail Information
Should Include Full Information as to the
Proposed Application of the Mercury
Switch.

ELECTRODE-TO-MERcury TYPE

The Electrode-to-Mercury type of Con-Tac-Tor Mercury Switches are designed for normal service having a current carrying capacity up to 10 amperes at 110 volts or to 5 amperes at 220 volts. This type of mercury switch consists of a glass envelope with sealed-in electrodes and a quantity of mercury which makes and breaks contact with these electrodes to open and close the electrical circuit. Mercury switches are being used in a number of different industries for a wide variety of applications. Because the proper selection of a mercury switch depends upon a number of conditions, it is impossible to give a full description here of its many features and successful applications.

MERCURY-TO-MERcury TYPE

This type of mercury switch is designed for applications in which the ratings used range from 10 to 45 amperes 110 volts. Because of the heavier electrical load their construction differs somewhat. Within the glass envelope are sealed-in electrodes that are submerged beneath a quantity of mercury. In operation the two pools of mercury join or divide, making or breaking the electric circuit. The design of this type of switch is such that the arc formed occurs over the surface of a refractory or within a hard glass or quartz sleeve. In this type of mercury switch, in which the circuit is made or broken by the movement of two pools of mercury, there is a greater contact area which in turn results in greater current carrying capacity. Like the Electrode-to-Mercury type only the briefest information can be given here about this type of mercury switch.

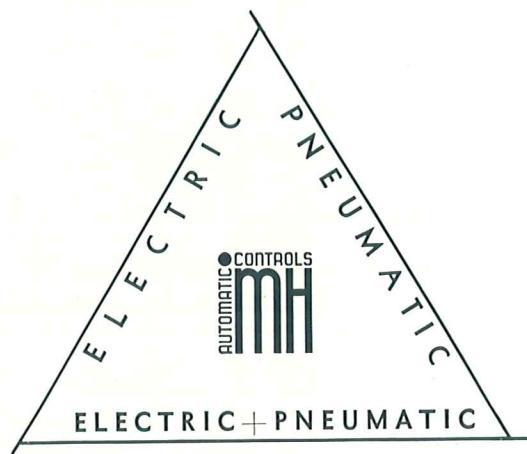


MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

The Modutrol System

NOW . . .

MODUTROL SYSTEM OF PNEUMATIC CONTROL AS WELL AS ELECTRIC



**A 3 WAY MODUTROL
SERVICE . . . THE
RIGHT CONTROL FOR
EACH APPLICATION**

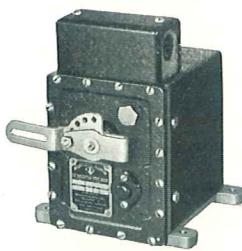
For the first time the heating, ventilating and air conditioning industry and its collaborating professions have available from one source a full range of automatic controls and control systems, electrically operated and air operated, or systems combining both pneumatic and electric control.

Experience has shown that neither air nor electric control is sufficiently universal in its application to be adapted to all control problems. Up to this time no manufacturer has been in a position to offer both types.

Now, however, the industry has available from one source, a full range of automatic controls and control systems, electrically operated and air operated or a combination of both—a three point service—the right control for each application.

The same superior services offered in the past by the Modutrol System of Electric Control will prevail for Pneumatic Control. An automatic control engineer is at your service at all times . . . branch offices and distributors are equipped to make the complete installation . . . thoroughly trained men are available to supervise, adjust or service the control equipment if the purchaser prefers to make his own installation of controls . . . and the Minneapolis-Honeywell Company is equipped to assume the entire responsibility for any control installation.

THE MODUTROL SYSTEM OF AUTOMATIC CONTROL FOR HEATING, VENTILATING AND AIR CONDITIONING



Prices Quoted on Request.

**Include Design and Operating
Data with Inquiry.**

THE MODUTROL MOTOR

One of the essential elements in the Modutrol System is the oil immersed Modutrol Motor which operates the valve or damper which controls the flow of steam, water, or air. This motor may be any of several types, depending on the work to be done—modulating (i.e. proportioning) type, or off-and-on type.

The M904A Modutrol Motor, modulating (proportioning) type; all moving parts of gear train immersed in oil, 110 or 220 volts, 25 to 60 cycles A.C.; low voltage; electrically operated in both directions; has oscillating crank arm with adjustable radius to vary the throw; oscillates through 160 degree arc; available in 2 timing speeds of 60 and 120 seconds; continuous rating, 80 inch lbs. for 60 second timing and 108 inch lbs. for 120 second timing; stalling load, 160 inch lbs. for both 60 and 120 second timing; the load on the crank arm should never exceed 100 lbs.; current consumption, 24 watts running and 3 watts standby; external connection block enclosed in a removable housing for conduit wiring; panel arrangement allows for simplified change in the field to make motor available for compensated control or for "Series 60-Floating"; the motor may also be arranged for dual control.

The M204A Modutrol Motor, two position uni-directional type; crank arm rotates through 180° angular arc; no standby loss; available in 3 timing speeds of 35, 70 and 140 seconds; 40 inch lbs. continuous rating for 35 seconds timing; otherwise similar to Type M904A Modutrol Motor.

The M905A Modutrol Motor, modulating (proportioning) type; external spring furnished to operate the normal closing cycle; timing of approximately 35 seconds or less; crank arm oscillates through 60° angular arc; continuous rating, 25 inch lbs. minimum and 94 inch lbs. maximum, 120 inch lbs. stalling load; the load on the crank arm should never exceed 100 lbs.; current consumption, 24 watts running and 22 watts standby; otherwise similar to Type M904A Modutrol Motor.

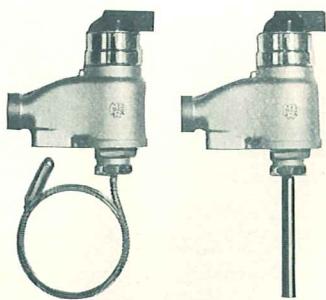
The M805A Modutrol Motor, two wire, low voltage; current consumption, 24 watts running and 19 watts standby; otherwise similar to Type M905A Modutrol Motor.

The M405A Modutrol Motor, two wire, line voltage; otherwise similar to Type M805A Modutrol Motor.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

The Modutrol System of Electric Control



Prices Quoted on Request.

Include Design and Operating Data with Inquiry.

THE MODUSTAT

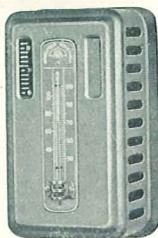
The Modustat is a self-contained automatic room temperature control valve for individual radiators. It is designed for use only with two-pipe (direct, indirect cabinet type) steam, vapor, or vapor-vacuum heating systems operating on less than 10 lbs. pressure or 10" vacuum. This unit automatically modulates the flow of steam to the radiator in accordance with the temperature requirements of the room, increasing the Modustat orifice if more heat is needed and decreasing it if less heat is required.

Type V505-3 for exposed radiation, with hand set— $\frac{1}{2}$ ", $\frac{3}{4}$ " or 1".

Type V506-3 for concealed radiation, with hand set— $\frac{1}{2}$ ", $\frac{3}{4}$ " or 1".

Type V505-4 for exposed radiation, with key set— $\frac{1}{2}$ ", $\frac{3}{4}$ " or 1".

Type V506-4 for concealed radiation, with key set— $\frac{1}{2}$ ", $\frac{3}{4}$ " or 1".



Prices Quoted on Request.

Include Design and Operating Data with Inquiry.

SERIES 90 THERMOSTATS

These thermostats employ a sensitized metal bellows to actuate a slide wire (Potentiometer) such as required in the control of Series 90 Motors for Proportioning service. Thus these instruments will impart a truly modulating action to valves or dampers motorized with M904, M92-1 or M93-1 Motors.

Type T92A (Series 90) single potentiometer.

Scale Ranges: 65-85° F. (Std.), also 40-60° F., 50-70° F., and 80-100° F.

Type T92B.

Like T92A but arranged with two potentiometers for simultaneous or sequence control of two separate Series 90 Circuits.

Models similar to the above but arranged for compensated or effective temperature control circuits are available Write for details.



Prices Quoted on Request.

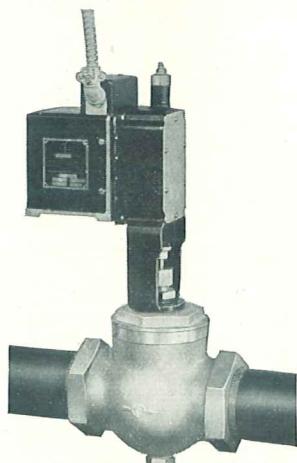
Include Design and Operating Data with Inquiry.

ELECTRIC RADIATOR VALVE

Type V205-1 Electric Radiator Valve is a low voltage motor-operated valve for installation on individual radiators or steam coils and controlled by Series 20 room thermostat or other Series 20 controllers; available with dual control switch permitting operating several valves in multiple; may be manually operated in event of current failure. It is motor-driven, is single seated, packless construction and is practically noiseless.

Available for 110-220 volts, 50-60 cycle only; 60 seconds timing. Sizes $\frac{3}{4}$ " to 2".

Type V605-1 Electric Radiator Valve is similar in construction and operation to the V205-1 valve but designed for line voltage (110 or 220 volts), 50-60 cycle and line voltage controller such as Type T62, 3-wire thermostat or similar controller.



Prices Quoted on Request.

Include Design and Operating Data with Inquiry.

TYPE K200 AND TYPE K202

The Type K200 is a motorized steam, gas or water flow control valve of the single seat globe type. Valve discs available for various operating pressures and mediums. Available with dual control switch for operation of additional valves or primary controls from one controller. Valve body and trim is all bronze

The Type K202 with globe type body is similar to the Type K200 motor valve assembly in appearance. Motor operation of a pilot permits operation of single disc main port on pressure up to 125 lbs. It is available with bronze monel or composition discs. State specifications when ordering.

Type K200A (Series 20) Screwed Type only.

Max. Operating Pressure: $\frac{1}{2}$ - $\frac{3}{4}$ ", 125 lbs. per sq. in.; 1", 85 lbs. per sq. in.; $1\frac{1}{4}$ ", 60 lbs. per sq. in.; $1\frac{1}{2}$ ", 40 lbs. per sq. in.; 2", 25 lbs. per sq. in.; $2\frac{1}{2}$ ", 15 lbs. per sq. in.; 3", 10 lbs. per sq. in.

Type K202A (Series 20).

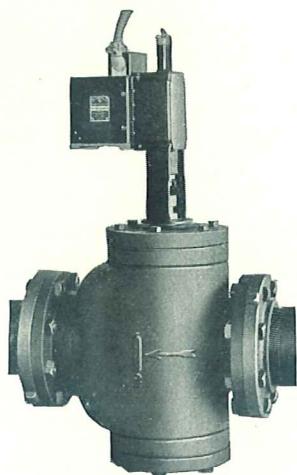
Valve Sizes: $\frac{1}{2}$ " to 6" Pilot operated. Max. Operating Pressure: 125 lbs.

List prices on extra heavy body types furnished on application.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

The Modutrol System of Electric Control



Prices Quoted on Request.

Include Design and Operating Data with Inquiry.

TYPES K201, K900 and K901

Type K201 motorized valves are of the semi-balanced or double seated variety and provide a complete line of valves for steam, water or air flow control. Sizes from $\frac{3}{8}$ " to 3" are furnished in all-bronze construction, screwed type, either globe or angle pattern. Three inch valves and other sizes up to 6" are furnished in semi-steel body construction with bronze trimming, flanged type and in globe or angle pattern. The valves are equipped with electric motor and provide on and off operation. Linkage is furnished. Submit full data on application when ordering.

Type K201.

Sizes $\frac{3}{8}$ "—3" Screwed Type—all bronze—globe or angle body.

Sizes $3\frac{1}{2}$ "—6" Flanged Type—semi-steel, bronze trim—globe or angle body.

Prices quoted on request.

Include design and operating data with request.

TYPE K900

These Modutrol Valves are very similar to the Type K200 except that they are intended for modulating flow by use of V-ported seats. They are powered with the M904A Modutrol Motor. Submit full details of proposed application for consideration and recommendations as to sizing, proper control and prices.

TYPE K901

This series of valves is of the modulating type and is similar as regards valve characteristics to Type K201. As Modutrol Valves they are equipped with the Modutrol Motor M904A. Submit full details of proposed applications for consideration and recommendations as to sizing, proper control and prices. Not available in sizes below 1".

The Weatherstat

General Application

The combined effect of all four outside weather factors which are temperature, wind direction, wind velocity and solar radiation determines the heat loss and consequently the heat requirements for any building.

It is obvious that the portion of a building receiving the benefits of the sun's rays should require less heat than other zones, and that those zones exposed to cold winds should receive more heat than those not so affected.

The Weatherstat is the only outside controller which responds to all of these four weather factors and the reaction of the Weatherstat to these outside conditions enables it to immediately compensate for outside changes by supplying more or less heat to the building or zone it controls as required. This results in the greatest efficiency and economy of operation.

The Weatherstat is applicable to almost any type of building having one of the following types of heating systems:

1. Steam or vapor furnished at a relatively constant pressure.
2. Steam or vapor furnished intermittently by a gas or oil burner.
3. Hot water under zone control.

In the latter two types of heating systems, provision must be made for keeping the boiler water up to a predetermined temperature at all times in order to prevent a time lag.

The fuel savings it effects make the Weatherstat an ideal medium for modernization as well as for new buildings because an investment in the Weatherstat is self-liquidating, and the benefits from tenant satisfaction are immeasurable.

Principle of Operation

The Weatherstat consists of a mass of iron, sufficient to obtain the necessary thermal capacity. This iron is shaped to contain a thermostatic element with the necessary electric contacts, and is arranged to house a small electrical heating element within the mass.

This unit is mounted in a small waterproof housing and the entire unit is securely mounted in a location in which it will be subject to the same weather conditions, temperature, wind direction, wind velocity, and solar radiation as the zone or building which it controls.

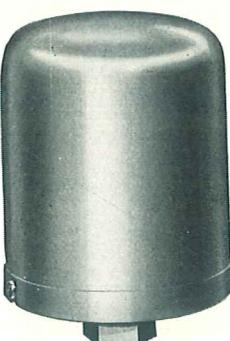
The heat release from the electrical heating element is designed to, and by an adjustable resistance can be made to, bear the same relation to heat losses from the control housing as the heat release from the heating fixtures within the building bears to heat losses of the building.

Being subject to the same weather influences, and the same relative rate of heating and cooling, the temperature throughout the zone or building and the temperature within the control housing will maintain a fixed relationship, and the temperature in the control housing can be used as the pilot temperature or control temperature for the zone or building.

The Weatherstat is wired so that when the thermostatic element in the control instrument calls for heat the electrical heating element is energized and heat is supplied to the zone or building at the same time. When the required temperature in the Weatherstat is attained, the circuit to the heating element is opened and heat is shut off to the zone or building.

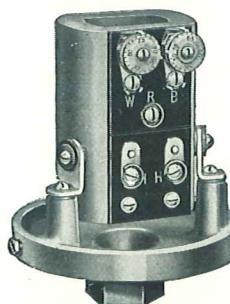
In reality, therefore, the Weatherstat is equivalent to a room out of doors, with the same heat loss ratio as the zone or building which it controls.

Additional information and prices furnished on request.



The Weatherstat

Outside View with Cover in Place



Inside View Showing Range Adjustments



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

The Modutrol System of Pneumatic Control

PNEUMATIC THERMOSTAT

The Pneumatic Thermostat is a wall type controller offered in various models for uniform temperature control by compressed air. The Pneumatic Thermostat is designed for use with all types of heating and cooling equipment and may provide either positive control or graduate control by compressed air.

Two temperature control, as offered by the Type T094A, maintains a normal temperature during the time a building, or any section of it, is occupied, and a lowered temperature during the unoccupied period with manual or clock control of normal and low temperature periods.

Duplex control, as offered by the Type T094B, also includes the "off" period feature of the Type T094A except that the shutdown is of a definite nature, not controlling at the lowered temperature.

Type T043A (30) positive direct two-pipe.

Type T093A (29) graduate direct two-pipe.

Type T093B (29-4) graduate direct two-pipe with wide differential.

Type T093C (35) graduate reverse two-pipe.

Type T093D (31) graduate direct one-pipe.

Type T093E (31R) graduate reverse one-pipe.

Type T094A (54) graduate direct three-pipe, two temperature.

Type T094B (36) graduate direct three-pipe, duplex.

Air pressure in branch line increases on a rise in temperature at the thermostat for direct action.

Non-adjustable differential of 2° F. for all types except T093B with 4° F.

Scale range: 38-82° F.

Pressure range: 0-15 pounds.

Finish: Black or as specified.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

SUBMASTER PNEUMATIC THERMOSTAT

The Type T095 Submaster Pneumatic Thermostat is a wall type controller that regulates room temperature by compressed air with reference to the demands of a master controller. This thermostat is designed for use with all types of heating and cooling equipment where graduate control by compressed air is desired.

The Submaster Thermostat will control temperatures at the degree indicated by its temperature setting dial. This setting, however, is determined by a master controller with reference to surrounding temperatures at the master instrument.

Type T095A (101) graduate reverse three-pipe.

Non-adjustable differential of 2° F.

Scale range: 54-98° F.

Pressure range: 0-15 pounds.

Rod adjustment: 10, 12½, or 15° F.

Finish: Black or as specified.

Pneumatic Humidity Controllers

PNEUMATIC ROOM TYPE HUMIDITY CONTROLLER

The Type H093 Pneumatic Humidity Controller is an air-operated wall type controller reacting to changes in relative humidity to prevent humidity from exceeding a predetermined maximum or minimum, or to regulate the equipment used for dehumidification. This type of humidity controller is designed for use where graduate control by compressed air is desired.

Type H093A (57) graduate direct two-pipe.

Type H093B (57R) graduate reverse two-pipe.

Type H093C (56) graduate direct one-pipe.

Type H093D (56R) graduate reverse one-pipe.

Air pressure in branch line increases on an increase in humidity at the controller for direct action.

Non-adjustable differential of 2-3%.

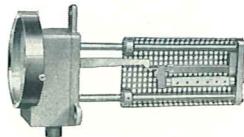
Scale range: 25-90%.

Pressure range: 0-15 pounds.

Finish: Black or as specified.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

PNEUMATIC INSERTION HUMIDITY CONTROLLER

The Type H094 Pneumatic Humidity Controller is an air-operated, insertion type controller reacting to changes in relative humidity to prevent humidity from exceeding a predetermined maximum or minimum, or to regulate the equipment used for dehumidification. This type of controller is designed for use where graduate control by compressed air is desired.

Type H094A (71) graduate direct one-pipe.

Type H094B (71R) graduate reverse one-pipe.

Air pressure in branch line increases on an increase in humidity at the controller for direct action.

Non-adjustable differential of 2-3%.

Scale range: 0-100%.

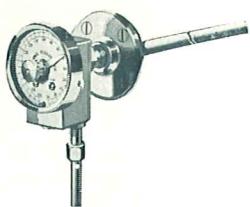
Pressure range: 0-15 pounds.

Finish: Nickel plated or as specified.



The Modutrol System of Pneumatic Control

PNEUMATIC INSERTION THERMOSTAT

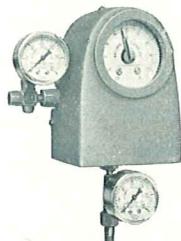


Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

The Insertion Thermostat is an air-operated controller reacting to changes in temperature by actual insertion of the element directly in ducts or in liquids of tanks. The Insertion Thermostat is designed for use with all types of heating and cooling equipment where graduate control by compressed air is desired.

Type L092A (65) graduate direct two-pipe.
Type L092B (65R) graduate reverse two-pipe.
Type L092C (64) graduate direct one-pipe.
Type L092D (64R) graduate reverse one-pipe.
Type L094A graduate direct one-pipe master.
Type L094B graduate reverse one-pipe master.

Air pressure in branch line increases on a rise in temperature at the insertion thermostat for direct action.
Non-adjustable differential of 3° F. for Type L092 and 30° F. for Type L094.
Scale range: 20-180° F. for Type L092 and 20-120° F. for Type L094.
Pressure range: 0-15 pounds.
Finish: Nickel plated or as specified.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

The Type L095 Submaster Insertion Thermostat is an air operated controller reacting to changes in temperature with reference to the demands of a master controller by actual insertion of the element directly in ducts or in liquids of tanks. The Submaster Insertion Thermostat is designed for use with all types of heating and cooling equipment where graduate control by compressed air is desired.

The Submaster Insertion Thermostat will control temperatures at the degree indicated by the temperature setting dial. This setting, however, is determined by a master controller with reference to surrounding temperatures at the master instrument.

Type L095A (69) graduate direct one-one pipe.
Type L095B (69R) graduate reverse one-one pipe.

Air pressure in branch line increases on a rise in temperature at the controller for direct action.
Adjustable differential of 4-16° F.
Scale range: 20-120° F.
Pressure range: 0-15 pounds.
Finish: Cast aluminum.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

The Airstream Insertion Thermostat is a low limit, air operated controller reacting to changes in temperature by actual insertion of the element directly in the outlet grill of the unit ventilator. This controller is designed for use with all types of unit ventilators where instant control by compressed air is desired.

The Airstream Insertion Thermostat secures its results by varying the air pressure in a branch line leading to diaphragms of valves or damper motors. This controller acts as a low limit device preventing temperatures from falling below a certain point and usually will be used in conjunction with a room thermostat.

Type L093A (66) graduate one-pipe.
Non-adjustable differential of 6° F.
Pressure range: 0-15 pounds.
Finish: Natural brass.

Pneumatic Static Pressure Regulator



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

PNEUMATIC STATIC PRESSURE REGULATOR

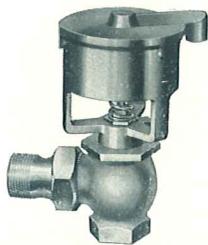
The Pneumatic Static Pressure Regulator is a gradual type controller maintaining a constant static pressure in supply ducts. This controller is designed to govern dampers so as to relieve or build up pressure where graduate control by compressed air is desired.

Type P091A graduate.
Differential: Adjustable by knurled knob from .005" of water to 28" of water.
Static differential: 0-2".
Air pressure range: 0-15 pounds.
Pipe size: $1/8"$.
Finish: Copper.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



The Modutrol System of Pneumatic Control



Prices Quoted on Request.
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Data with Inquiry.

PNEUMATIC RADIATOR VALVE

The Pneumatic Radiator Valve is an expertly designed and constructed diaphragm valve developed to control the flow of steam or hot water to individual radiators. The Pneumatic Radiator Valve is designed to reliably translate demands of an air-operated controller into mechanical action at the radiator. This instrument is positioned by the expansion or contraction of Metaphram all metal diaphragm assemblies.

Type V052A 4" valve top.
Type V052B 3" valve top.

Air pressure range: 0-15 pounds.
Liquid pressure: 10 pounds per sq. inch maximum.
Pattern: Angle, globe, right or left hand corner, and back offset.
Pipe sizes: $\frac{1}{2}$ " to 2" for 4" valve top, $\frac{1}{2}$ " to 1" for 3" valve top.
Spring range: 3-10 lbs. for direct radiation only and $\frac{1}{4}$ lbs. for direct radiation with unit ventilators.
Finish: Nickel plated.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

PNEUMATIC COIL VALVE

The Pneumatic Coil Valve is an expertly designed and constructed diaphragm valve developed for the control of blast heating coils and other similar uses. This type valve is designed to reliably transmit demands of an air-operated controller into mechanical action at the heat source.

Type V053A single seated, 4" Metaphram.
Type V053B single seated, 7" Metaphram.
Type V053C single seated, 10" Metaphram.
Type V054A double seated direct, 4" Metaphram.
Type V054B double seated reversed, 4" Metaphram.
Type V054C double seated direct, 7" Metaphram.
Type V054D double seated reversed, 7" Metaphram.
Type V054E double seated direct, 10" Metaphram.
Type V054F double seated reversed, 10" Metaphram.
Type V055A three way mixing, 4" Metaphram.
Type V055B three way mixing, 7" Metaphram.
Type V055C three way mixing, 10" Metaphram.

Air pressure range: 0-15 pounds.
Liquid pressure: 10 pounds per sq. inch maximum.
Pattern: Globe and angle.
Pipe sizes: single seated, $\frac{1}{2}$ " to 6"; double seated, $\frac{1}{2}$ " to 16"; three way mixing, $\frac{1}{2}$ " to 6".
Finish: Black.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

PNEUMATIC UNIT VENTILATOR VALVE

The Pneumatic Unit Ventilator Valve is an expertly designed and constructed diaphragm valve developed to open and close the heat supply to the heating coil in a unit ventilator. This valve is designed to reliably transmit demands of an air-operated controller into mechanical action at the heating coil.

Type V056A
Pressure range: 0-15 pounds.
Liquid pressure: 10 pounds per sq. inch maximum.
Pattern: Globe single-seated.
Pipe sizes: $\frac{3}{4}$ " to 2".
Spring range: 3-8 lbs. or 6-11 lbs.
Finish: Black.

Pneumatic Metaphram Motor



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

PNEUMATIC METAPHRAM MOTOR

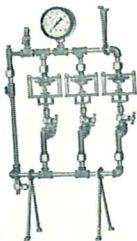
The Pneumatic Metaphram Motor is a powerful and sturdily built device providing a convenient means of translating demands from controllers — operating on functions of temperature, pressure or relative humidity — into mechanical motion. The Pneumatic Metaphram Motor is designed for use with dampers in an air-operated control system.

Type M052A 4" size.
Type M052B 5 $\frac{1}{2}$ " size.
Type M052C 7" size.
Type M052D 10" size.
Pressure range: 0-15 pounds.
Stud and leg types.
Finish: Black.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

The Modutrol System of Pneumatic Control



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

ACCUMULATOR CONTROL

The Accumulator Control is an air-operated relay for the operation of heating coils so arranged that a single instrument can control up to five banks of coils, opening and closing the valves consecutively. This instrument is designed for use with all types of heating and cooling equipment where graduate control by compressed air is desired.

Type R091A graduate two-point.
Type R091B graduate three-point.
Type R091C graduate four-point.
Air pressure range: 0-15 pounds.
Type of mounting: $\frac{1}{8}$ " pipe size.
Finish: Natural brass.



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

PNEUMATIC RELAY

The Pneumatic Relay is an automatic device for special applications of control to valves and dampers. The Pneumatic Relay is designed for use with all types of heating and cooling equipment and may provide either positive or graduate control by compressed air.

The Electric-Pneumatic Relay (Type R041A) is generally used in connection with dampers, particularly on those operating in conjunction with fresh air and exhaust fan units.

The Pneumatic Relay (Type R042A) is generally used with graduate type controllers operating mixing dampers in a split system to provide the means of control for direct radiation.

The Graduate Direct Relay (Type R093A) permits a secondary air line to maintain the same pressure as the thermostat branch line.

The Graduate Reverse Relay (Type R093B) permits the branch line of relay to increase pressure in proportion to thermostat decrease, or decrease pressure in proportion to thermostat increase.

Type R041A electric-pneumatic type.
Type R042A pneumatic type.
Type R093A graduate direct.
Type R093B graduate reverse.

Pneumatic Switches



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

PNEUMATIC SWITCHES

The Pneumatic Switch is a manual switching device for the remote control of valves and dampers.

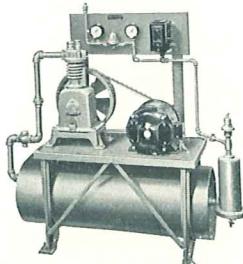
The Type S044A furnishes positive action of the push button variety, holding valves or dampers under control in an entirely open or completely closed position.

The Type S045A is a three way switch of the lever handle type allowing two positions of control which would normally be "open" and "closed." The Type S045B is also a three-way switch which allows three positions of control which would normally be "open," "closed" and "automatic."

For graduated control of dampers, the Type S091A is offered. This switch is so constructed that branch line pressure can be maintained at any desired point from 0 to 15 pounds.

Type S044A push button type.
Type S045A three way cock, two positions.
Type S045B three way cock, three positions.
Type S091A graduate type.

Pneumatic Compressors



Prices Quoted on Request.
Include Design and Operating
Data with Inquiry.

PNEUMATIC ELECTRIC COMPRESSOR

The Pneumatic Electric Compressor and its accessories maintain air pressure in control systems constant at fifteen pounds. This compressor is installed with sufficient capacity so that under normal conditions it operates but one-third of the time. Protection against both condensation and dust is included as well as a tank pressure safety feature.

Type W010A 1/6 horsepower motor unit for 1-4 thermostats.*
Type W010B $\frac{1}{3}$ horsepower motor unit for 5-20 thermostats.*
Type W010C $\frac{1}{2}$ horsepower motor unit for 21-50 thermostats.*
Type W010D $\frac{3}{4}$ horsepower motor unit for 51-75 thermostats.*
Type W010E 1 horsepower motor unit for 76-100 thermostats.*
Type W010F $1\frac{1}{2}$ horsepower motor unit for 101-250 thermostats.*

*All leaks count as thermostats.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Brown Temperature Instruments

POTENIOMETER PYROMETERS FOR CONTROLLING, RECORDING AND INDICATING TEMPERATURES FROM 0 TO 3000° F.

An extremely accurate and dependable instrument, designed and built for industrial service. Operating on the Potentiometer Principle, the instrument can be located any distance from the point of temperature measurement (thermocouple location) without affecting its accuracy or dependability.

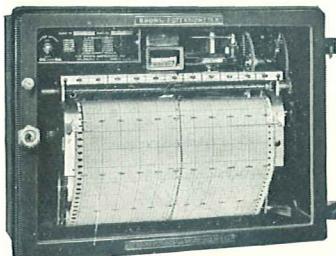


Fig. 1

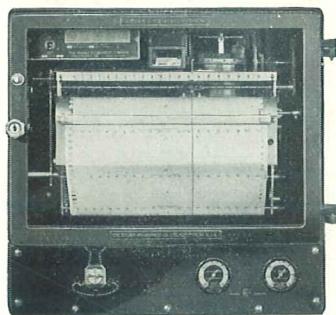


Fig. 2

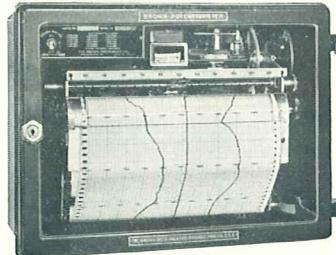


Fig. 3

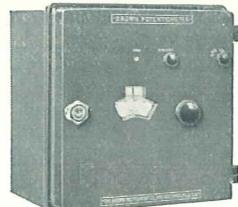


Fig. 4



Fig. 5

Charts and scales for a wide variety of ranges are available, from a minimum temperature span of 200° F. to a maximum span of 3000° F. Corresponding Centigrade scales and charts are also available.

Pyrometer accessories, such as thermocouples and extension lead wire, furnished with instruments to meet the individual requirements of each job.

Controlling (Figures 1 and 2)

Furnished in two types, electric operated and air operated.

ELECTRIC OPERATED (Fig. 1)—Equipped with one or two contact mercury switches for controlling electric heating loads, two or three contact mercury switches for controlling two or three position motor-operated valves and with rheostats for controlling Minneapolis-Honeywell Proportioning or modulating motor-operated valves. Available in both recording and indicating models. Single point controllers are standard, however two-point and three-point controllers can be furnished to meet special requirements.

AIR OPERATED (Fig. 2)—Combines in one instrument the measuring and recording precision of the potentiometer and the adaptability of the air operated controller. Equipped with AIR-o-LINE control unit, having throttling range adjustable 0 to 150% and automatic reset for operating air operated diaphragm valves. Available as single point recording or indicating controllers.

Recording (Figure 3)

Furnished in five models for recording one, two, three, four, or six temperatures on a single chart, 12 inches wide. The single point recorder uses an ink pen and the multiple recorders use a multi-colored ribbon or print wheels giving individual numeral for each record and producing up to six records in distinctive colors and color combinations. An oversize synchronous motor with ample reserve power drives the entire mechanism at constant speed.

Indicating (Figure 4)

Reading is obtained on a large, circular scale, 15 inches long by balancing the galvanometer manually. Can be connected directly to one thermocouple or by means of suitable switches, to any number of thermocouples.

Portable (Figure 5)

A small, compact, portable potentiometer for checking all types and makes of pyrometers and thermocouples. Has a total range of 71 millivolts. Scale can be read to within .01 millivolt. Weighs only 12½ lbs.

For Complete Details refer to Catalog No. 1001—"Brown Potentiometer Pyrometers." Prices Quoted on Request—State Proposed Applications.



MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Brown Temperature Instruments

MILLIVOLTMETER PYROMETERS FOR CONTROLLING, RECORDING AND INDICATING TEMPERATURES FROM 0 TO 3000° F.

A direct-reading, simple and sturdy pyrometer, especially suited for industrial applications where simplicity and ruggedness are of greater importance than extreme accuracy. The instrument can be calibrated to compensate for long lengths of extension lead wire between thermocouples and instrument. No dry cells or standard cells required.

Charts and scales for a wide variety of ranges are available, from a minimum temperature span of 800° F. to a maximum span of 3000° F. Corresponding Centigrade scales and charts are also available.

Pyrometer accessories, such as thermocouples and extension lead wire, furnished with instruments to meet the individual requirements of each job.

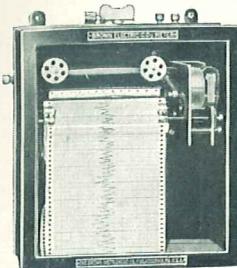


Fig. 1

Furnished in two types of electric controllers.

The Recording Controller (Fig. 1) is equipped with metal-to-metal contacts for controlling electric heating loads and two and three position motor operated valves. Single record controllers are standard. Information on multiple recording controllers will be furnished upon receipt of application details.



Fig. 2

The Indicating Controller (Fig. 2) is equipped with one or two contact mercury switches for electric heating loads and two and three contact mercury switches for controlling two and three position motor operated valves.

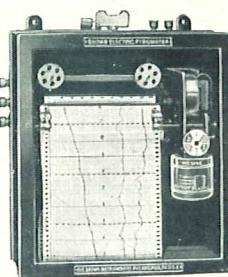


Fig. 3

Recording (Figures 3 and 4)

Furnished in three types for recording from one to twelve temperatures on a single chart, 7" wide.

Single point recorders (not illustrated) record the temperature on a full-width chart using an inked ribbon.

Multiple models (Fig. 3) record from two to six temperatures on a full-width chart using a multi-colored ribbon.

Multiple-Duplex models (Fig. 4) record from two to twelve records on two sections of a full-width chart, using two measuring systems and multi-colored inked ribbon.

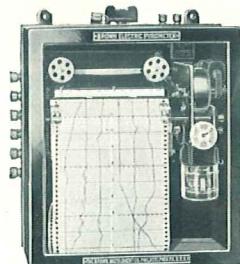


Fig. 4

Indicating (Figure 5)

Reading is obtained directly on a 6 inch scale without the necessity of any balancing or hand manipulation. Can be connected directly to one thermocouple, or by means of suitable switches, to any number of thermocouples.



Fig. 5

Portable (Figure 6)

Suitable for checking all makes and types of millivoltmeter pyrometers. Reading obtained directly from a 5-inch scale, without manual balancing. Furnished either with a scale graduated in temperature or in millivolts.

For Complete Details refer to Catalog No. 1001—"Brown Pyrometers-Millivoltmeter Type." Prices Quoted on Request.



Brown Hygrometers

HYGROMETERS FOR CONTROLLING, RECORDING AND INDICATING PER CENT HUMIDITY

Hair Hygrometer gives a direct reading of per cent relative humidity. The pen is actuated by a sensitive bundle of human hairs through a simple lever system. The expansion and contraction of these hairs with changes in relative humidity is converted into pen motion over a uniformly graduated chart (reading 0 to 100%). The instrument gives quick and accurate response to changing air conditions wherever it is mounted.

Psychrometer, or Wet and Dry Bulb Thermometer, records humidity in terms of wet bulb and dry bulb temperatures, which are readily converted into relative humidity by referring to a humidity table. It con-

sists of a two-pen recording thermometer in which one bulb measures air temperature, and the other, the wet bulb, is cooled by evaporation from a wick or a porous tube to a lower temperature. The lower the humidity, the greater the wet bulb depression for a given temperature and a corresponding greater divergence between the two pens. The instrument is made in a variety of forms to meet all requirements: Class I (Liquid Filled), Class 2 (Vapor Tension), Class 3 (Gas Filled), and Class 4 (Mercury Filled).

Electrical Resistance Psychrometer, Refer to Page 6 on Resistance Thermometers, and Catalog 9001 for detailed explanation.

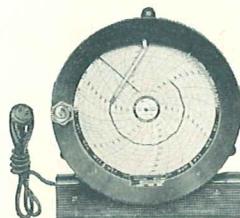


Fig. 1

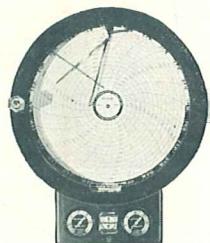


Fig. 2

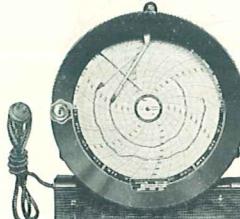


Fig. 3

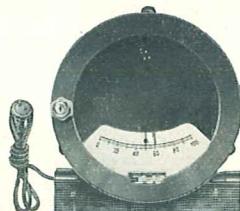


Fig. 4

Controlling (Figures 1 and 2)

Indicating and Recording. Furnished in two types, electric operated and air operated.

ELECTRIC OPERATED (Fig. 1)—Hair Hygrometer Controller: Equipped with single contact mercury switch for operation of signal lights, alarms, motorized valves, humidifying devices, etc. Two or three contact switches control motorized valves.

Humidity Controller: Equipped with two separate control switches which are independent of each other. One controls dry bulb temperature or quantity of heat supplied, the second controls wet bulb or quantity of moisture supplied.

AIR OPERATED (Fig. 2)—Equipped with any one of four control units. Air-O-Line, Full Throttler, Throttler and On-Off for operating air operated diaphragm valves. Type of control unit to be recommended depends upon the details of each application. Single pen controllers are standard in Air-O-Line, Full Throttler and On-Off types. Two pen controller available in Throttler type. Recording controllers furnished with electric or hand-wound clocks.

Recording (Figure 3)

Single and two-pen recorders furnished in 8" chart size. Record lines made with ink. Two-pen recorders use a different colored ink for each record. Each pen is free to cover the full chart span. Electric or hand-wound clock optional.

Indicating (Figure 4)

Furnished in standard 10" case so all indicators are similar in appearance to recorder using 8" chart. Reading obtained directly on 6" scale.

For Complete Details refer to Catalog No. 6501—"Brown Hygrometers." Prices Quoted on Request—State Proposed Applications.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Brown Flow Meters

ELECTRIC AND MECHANICAL FLOW METERS FOR CONTROLLING, RECORDING, TOTALIZING AND INDICATING THE FLOW OF FLUIDS SUCH AS STEAM, WATER, AIR, GAS, OIL, ETC.

Brown Flow Meters are available in two types, the Inductance Bridge Type (electric type) and the Mechanical type.

INDUCTANCE BRIDGE TYPE—Complete equipment consists of three units, the orifice plate, manometer and instrument. Instrument can be located at a remote point from the orifice and manometer (point of flow measurement).

Because of this flexibility, it is particularly adaptable for applications where instruments are to be remotely located for control purposes.

MECHANICAL TYPE—Complete equipment consists of two units, the orifice plate and the instrument. The meter body is integral with the instrument. Readings are transmitted mechanically from meter body to instrument.

Because the instrument must be connected directly to the orifice taps by copper tubing, this type of flow meters is offered for those applications where it is satisfactory to locate the instrument comparatively close to the point of flow measurement.

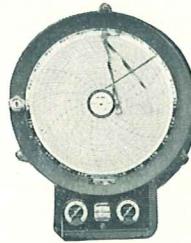


Fig. 1

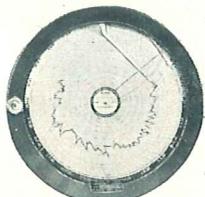


Fig. 2

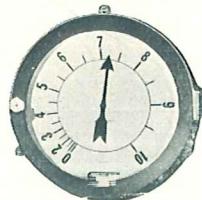


Fig. 3

Controlling (Figure 1)

Recording Air Operated Controllers equipped with either Air-o-Line or Full Throttler Control units are available for operating air operated diaphragm valves. Flow recorded on a 12" chart. Single pen controllers are standard.

Recording (Figure 2)

Single pen recorders available for recording "rate of flow" on 12" chart. Also furnished with additional pen and counter for recording and totaling "total flow" in addition to "rate of flow." Additional temperature and pressure pens can also be included.

Indicating (Figure 3)

Single pointer indicators for "rate of flow" available either with or without counter for "total flow."

Area Flow Meter

The Brown area meter is especially suitable for the measurement of heavy fuel oils and tars which cannot be successfully measured by the usual orifice type of meter because of the practical difficulties in transmitting the differential pressure through static pressure lines to the meter body. The area meter requires no orifice installation as the entire meter body (Figure 4) is connected into the pipe line like a valve. In addition to fuel oil and heavy tar, the area meter offers a very satisfactory means for measuring the flow of water, air and other gases in small pipe lines.

A special piston and sleeve can be supplied for the measurement of oxygen.

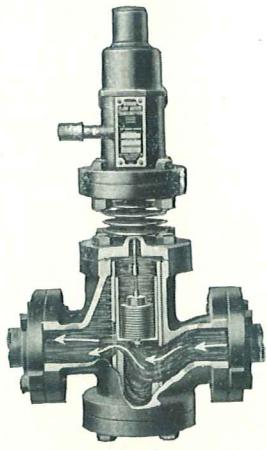


Fig. 4

For Complete Details refer to Catalog No. 2003—"Brown Flow Meters." Prices Quoted on Request—State Proposed Applications.



Brown Liquid Level Instruments

LIQUID LEVEL METERS ARE AVAILABLE IN THREE TYPES

INDUCTANCE BRIDGE TYPE (Electric)—Complete equipment consists of two units, the manometer and instrument. Readings are transmitted electrically by three-conductor wire; therefore, the instrument can be located at a remote point from the manometer (point of liquid level measurement).

Because of this flexibility, it is particularly adaptable for applications where instruments are to be centralized for control purposes.

MECHANICAL TYPE—Complete equipment in one unit, the meter body being integral with the instrument. Readings are transmitted mechanically from meter body to instrument.

Because the instrument must be connected directly by means of tubing to the vessel containing the liquid, this type of liquid level meter is offered for those applications where it is satisfactory to locate the instrument comparatively close to the point of liquid level measurement.

PRESSURE TYPE—Complete equipment consists of the instrument connected by copper tubing to a diaphragm box immersed in the liquid.

Similar to the mechanical type, this pressure type of liquid level meter is offered for those applications where the instrument can be located at close proximity of the point of liquid level measurement.

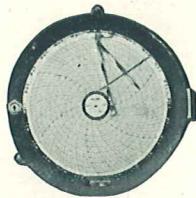


Fig. 1



Fig. 2

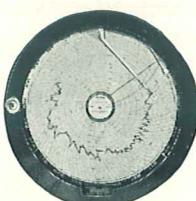


Fig. 3

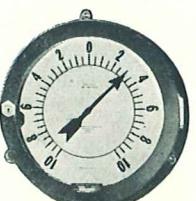


Fig. 4

Controlling (Figures 1 and 2)

Furnished in two types; electric operated and air operated.

ELECTRIC OPERATED (Fig. 1)—Equipped with two or three-contact mercury switches for operating two or three position motor-operated valves. Single pen recording controllers are standard.

AIR OPERATED (Fig. 2)—Recording air operated controllers equipped with either Air-o-Line or Full Throttler control units are available in operating air operated diaphragm valves. Liquid level recorded on a 12" chart. Single pen recording controllers are standard.

Recording (Figure 3)

12" recorders available in all three types. 8" recorders available in pressure type only. Single pen recorders are standard.

Indicating (Figure 4)

12" indicators available in electric type and mechanical type. 6" indicators available in pressure type.

Prices Quoted on Request—State Proposed Applications.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

• AUTOMATIC CONTROLS
MH

Brown Pressure Instruments

PRESSURE GAUGES FOR CONTROLLING, RECORDING AND INDICATING PRESSURES FROM 5" WATER COLUMN TO 3000 LBS. SQ. IN.

Charts and scales for a wide variety of ranges are available, from a minimum pressure span of 10 lbs./sq. in. to a maximum of 3000 lbs. per sq. in. Charts graduated in the following units are also available; ounces pressure per sq. in., feet head of water pressure, kilograms per sq. centimeter pressure, centimeters head of water pressure, millimeters head of

mercury pressure, pressure and vacuum, inches head of water pressure, and inches head of mercury pressure.

Controllers and recorders furnished in two sizes, one with a 12" diameter chart and the other with an 8" diameter chart. Standard, open face indicators can be supplied in sizes from 3½" to 12".

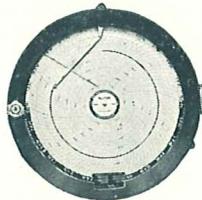


Fig. 1



Fig. 2

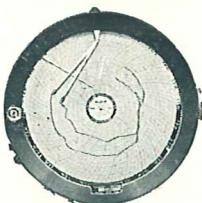


Fig. 3

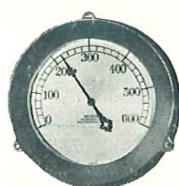


Fig. 4



Fig. 5

Controlling (Figures 1 and 2)

Recording and Indicating Controllers furnished in two types, electric operated and air operated.

ELECTRIC OPERATED (Fig. 1)—Equipped with two or three contact mercury switches for operating two or three-position motor operated valves. One and two pen recording controllers and single pointer indicating controllers are standard. Equipped with electric clock.

AIR OPERATED (Fig. 2)—Equipped with any one of four control units; Air-o-Line, Full Throttler, Throttler and On-Off for operating air operated diaphragm valves. Type of control unit to be recommended depends upon the details of each application. Single Pen recording controllers and single pen indicating controllers are standard. Recording controllers furnished with electric or hand-wound clock.

Recording (Figure 3)

Single pen and two-pen recorders furnished in both the 12" and 8" chart size. Three-pen recorders furnished in 12" chart size only. Record lines made with ink. Two and three-pen recorders use a different colored ink for each record. Each pen is free to cover the full chart span. Electric or hand-wound clock.

Indicating (Figure 4)

Available in standard sizes from 3½" to 12". Case can be furnished of iron, black enamel, brass or brass nickel-plated. The standard indicator has black enameled case and ring. The dial is silvered brass, having deep graduations filled with black enamel.

Portable (Figure 5)

Available in recording models using 10" die cast aluminum case with metal handle and legs, built to withstand the rough handling a portable instrument usually receives. Electric or hand-wound clock optional.

For Complete Details refer to Catalog No. 6703—"Brown Thermometers and Pressure Gauges." Prices Quoted on Request.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Brown Gas Analysis Instruments

CO₂ METERS FOR RECORDING AND INDICATING THE PER CENT CO₂ IN FLUE GAS

Analyzes the flue gases electrically and then transmits the readings electrically to an indicating or recording meter, or both. No moving parts or chemicals in the gas analysis cell.

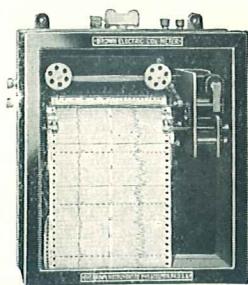


Fig. 1



Fig. 2

Recording (Figure 1)

Furnished in three types for recording from one to six readings on a single chart, 7" wide. Single point recorders record the percent CO₂ on a full width chart, using an inked ribbon. Multiple models record from two to four CO₂ readings on a full width chart using a multi-colored ribbon. Multiple duplex models record from two to six readings on two sections of a full width chart, using two measuring systems and two multi-colored inked ribbons. Flue gas temperature can be recorded on same duplex chart with CO₂ reading. One, two or three temperatures and CO₂ readings can be recorded on the same duplex chart.

Indicating (Figure 2)

Reading is obtained directly on a 6" scale without the necessity of any balancing or hand manipulation. Can be operated in parallel with recorder from one analysis cell.

For Complete details refer to Catalogue No. 3004—"Brown Electric CO₂ Meters." Prices Quoted on Request—State Proposed Applications.

Brown Tachometers

FOR INDICATING AND RECORDING THE SPEED OF ROTATING SHAFTS

Instruments can be calibrated to read in revolutions per minute, feet per hour, pieces per hour, or any other unit which is a function of the speed of the driving shaft.

Complete equipment consists of a tachometer generator and an instrument connected by two-conductor copper wire. As readings are trans-

mitted electrically, the instrument can be located any distance from the generator.

The generator is connected to the driving shaft through gears, pulleys, chain or flexible coupling as will best meet the particular requirements.

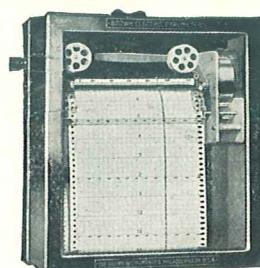


Fig. 1

Recording (Figure 1)

Furnished in three types for recording from one to twelve speeds on a single chart 7" wide. Single point recorders record the speed on a full width chart using an inked ribbon. Multiple models record from two to six speeds on a full width chart, using a multi-colored ribbon. Multiple duplex models record from two to twelve speeds on two sections of a full width chart, using two measuring systems and two multi-colored inked ribbons.



Fig. 2

Indicating (Figure 2)

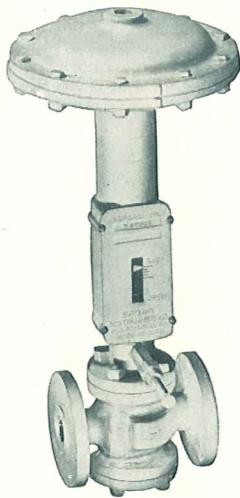
Reading is obtained directly on a 6" scale without the necessity of any balancing or hand-manipulation. Can be operated in conjunction with recorder off one generator.

For Complete Details refer to Catalog No. 46—"Brown Tachometers." Prices Quoted on Request—State Proposed Applications.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

• AUTOMATIC CONTROLS
MH

Air-Operated Valves



For Controlling the Flow of Any Fluid, Such as Oil, Gas, Steam, Water, Air, Etc.

Available in sizes from $\frac{1}{2}$ " to 4" in the straight through, screwed pattern and $\frac{1}{2}$ " to 8" in the straight through, flanged pattern.

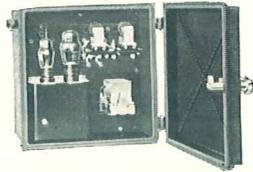
Furnished with bodies of semi-steel, cast-steel, bronze, and iron and with trim of bronze, monel and 18-8 stainless steel, for pressures as high as 900 lbs. per sq. in. at 750°F. and 1500 lbs. per sq. in. at 100°F.

Valve stem and spring adjustments are protected from damage by a cover plate on which is mounted a valve position indicator. All valves are equipped with valve stem lubricator.

For use with any air operated control instrument of the On-Off, Limited Throttling, Full Throttling, or Full Throttling with Automatic reset type.

See Catalog No. 8901—"Brown Air Operated Controllers." Prices Quoted on Request—State Proposed Applications.

The Protectoglo System



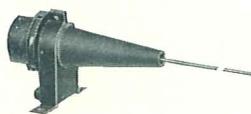
For Safeguarding Gas Burning Equipment Where the Escape of Raw Gas Would Create a Hazardous Condition

The complete system consists of a flame-sensitive electrode, relay, shutoff valve, and a primary controller or pushbutton station. A flare pilot valve or electric ignition can be supplied as optional features. The flame-sensitive electrode unit is merely a mounting bracket and housing for the insulator and electrode proper, and all the operating mechanism is housed in the dust-proof, splash-proof relay housing.

By the practical application of electronics, the electrical conductivity of the flame is used to determine the presence or absence of a pilot flame, resulting in instantaneous action with no measurable interval between pilot failure and complete shutdown. Gas is supplied to the main burner only when an adequate pilot flame is present. The system can be supplied with the ignition, flare pilot and main gas valve interlocked in a definite sequence, any interruption of which will cause the main gas valve to close.

The system is arranged for operation from any two or three-wire type of primary controller for automatic control installations and for operation from a three-wire push button for manual control.

Available for operation on all standard A.C. voltages and frequencies.

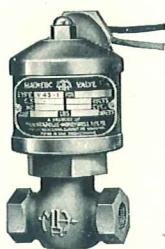


Write for Complete Details. Refer to Bulletin No. 90-1. Prices Quoted on Request—State Proposed Application.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

AUTOMATIC CONTROLS
MH

Safety Shutoff Valves



SOLENOID WATER VALVE—TYPE V43

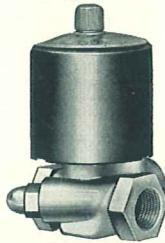
For Controlling the Flow of Water, Air and Other Non-Corrosive Fluids

Available only with $\frac{3}{8}$ " screwed body, straight through pattern, for a maximum pressure of 150 lbs./sq. in.

Built for 2-wire control circuit using 20 volt A.C. or any standard A.C. or D.C. line voltage. Has $\frac{1}{2}$ " conduit connection.

When the solenoid coil is energized, the valve opens, and when the current is cut off, the valve closes, automatically providing a safety shut-down on power failure.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 8, Page 112. Prices Quoted on Request—State Proposed Applications.



SOLENOID GAS PILOT VALVE—TYPE V46

For Use as an Expanding Pilot Valve for High-Low Pilots or as a Shutoff Valve for Electric-Gas Ignition

Has an adjustable bypass which is tight closing so complete shut-off can be obtained.

Available only with $\frac{3}{8}$ " screwed body, either straight through or angle pattern, for pressures up to 3 lbs./sq. in. depending on application.

Built for 2-wire control circuit using 20 volt A.C. or any standard A.C. or D.C. line voltage. Has $\frac{1}{2}$ " conduit connection.

When the solenoid coil is energized, the valve opens, and when the current is cut off, the valve closes, automatically providing a safety shut-down on power failure.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 8, Page 104. Prices Quoted on Request—State Proposed Applications.



SOLENOID GAS CONTROL VALVE—TYPE V44

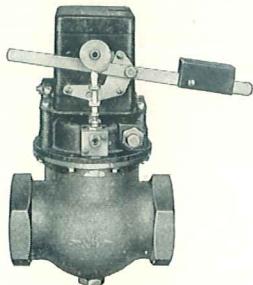
For Controlling the Flow of Gas Where Only a Limited Capacity is Required and a Relatively Inexpensive Valve is Desired for Controlling the Flow of Gas

Available with $\frac{3}{4}$ ", 1" and $1\frac{1}{4}$ " screwed bodies, straight through pattern, for pressures up to 4 lbs./sq. in. depending upon application.

Built for 2-wire control circuit using 20 volt A.C. or any standard A.C. or D.C. line voltage. Has $\frac{1}{2}$ " conduit connection.

When the solenoid coil is energized, the valve opens, and when the current is cut off, the valve closes, automatically providing a safety shut-down on power failure.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 8, Page 116. Prices Quoted on Request—State Proposed Applications.



MOTORIZED SLOW OPENING GAS CONTROL VALVE—TYPE V407

For Controlling the Flow of Gas

Available with $1\frac{1}{2}$ ", 2", $2\frac{1}{2}$ " and 3" screwed bodies; and 3", 4" and 6" flanged bodies, straight through pattern for a maximum pressure of 5 lbs./sq. in. depending on application.

Equipped with either a direct or reverse acting damper arm and an adjustable flare pilot for on-off or high-low operation.

Built for use with any 2 or 3-wire, two position, primary controller or manual control switch using 20 volt A.C. or any standard A.C. line voltage.

Known as the stalled-motor, spring-closing type, the motor opens the valve and compresses the closing spring simultaneously in approximately 30 seconds. When the motor is de-energized, the closing spring returns the valve to the closed position in approximately 3 seconds. Automatically provides a safety shut-down on power failure.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 7, Page 306. Prices Quoted on Request—State Proposed Applications.



MOTORIZED QUICK OPENING GAS CONTROL VALVE—TYPE V413

For Controlling the Flow of Gas

Available with $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", 2" and $2\frac{1}{2}$ " screwed bodies, straight through pattern, for gas pressures up to $1\frac{1}{2}$ lbs. per sq. in., depending on application. Has two pilot line outlets (normally plugged), on the inlet side of the valve body.

Built for use with any 2 or 3-wire, two-position primary controller or manual control switch using 20 volt A.C. or any standard A.C. line voltage.

Known as the stalled motor, spring closing type, the motor opens the valve and compresses the closing spring simultaneously in 2 or 3 seconds. When the motor is de-energized, the closing spring returns the valve to the closed position in 1 to 2 seconds. Automatically provides a safety shut down on power failure.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 7, Page 312. Prices Quoted on Request—State Proposed Applications.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Motor-Operated Valves

INDUSTRIAL MOTORS

Suitable for Operating Valves, Dampers, Louvers, Etc., from Automatic Primary Controllers Such as Pyrometers, Thermometers, Etc., or from Remote Manual Switches

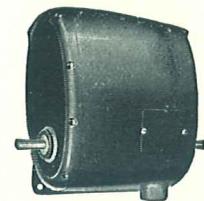
The industrial motors are essentially motor-driven speed reducers, having the motor and gear train units assembled in a compact, totally enclosed, dust and splash-proof housing.

Wide face, high strength, aluminum alloy gears, and steel pinions are used throughout.

For two-position control, a uni-directional, single phase squirrel cage, brushless type motor is used, equipped with a split-track maintaining switch. Furnished for operation on either A.C. or D.C.

For proportioning and floating control, two, single phase, squirrel cage, brushless type motors are mounted in tandem on a common shaft. Equipped with adjustable limit switches for obtaining any angular rotation from a minimum of 45° to a maximum of 180°. Furnished for operation on all standard A.C. voltages and frequencies.

Depending on the application, these industrial motors are assembled with different gear trains having timing speeds anywhere from a minimum of 10 seconds to a maximum of 105 seconds per 180° of output shaft rotation in the 8 ft. lb. size, and to a maximum of 120 seconds in the 18 ft. lb. size.



For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 11, Page 150. Prices Quoted on Request—State Proposed Applications.



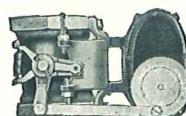
MOTORIZED GLOBE TYPE VALVES

For Controlling the Flow of Water, Brine, Steam, Oil, Air or Gas

Available with 1/2" to 3" brass screwed bodies, straight through patterns, for pressures up to 150 lbs./sq. in. and in cast iron or steel, flanged bodies for pressures in excess of 150 lbs. per sq. in. Cast iron or steel flanged bodies available in sizes larger than 3" for pressures, depending on size.

For use with any standard two-position, floating or proportioning industrial motor.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 7, Page 150. Prices Quoted on Request—State Proposed Applications.



MOTORIZED BUTTERFLY TYPE VALVES

For Controlling the Flow of Liquids and Gases Where Tight Shutoff is Not Essential, Such as Regulating the Flow of Primary Air to Low Pressure Inspiring Burners on Gas-Fired Industrial Furnaces

Available with brass, screwed body in sizes from 2" to 6" and in either screwed or flanged, cast-iron bodies in sizes from 2" to 12" inclusive.

The standard industrial motor operates the valve disc through a spring-release drive mechanism equipped with adjustable stops, making it possible to limit the valve disc travel within any desired limits. These stops can readily be adjusted in the field while the equipment is in operation.

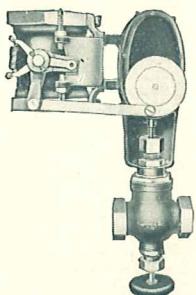
For use with any standard two-position, floating or proportioning industrial motor.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 7, Page 156. Prices Quoted on Request—State Proposed Applications.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Motor-Operated Valves



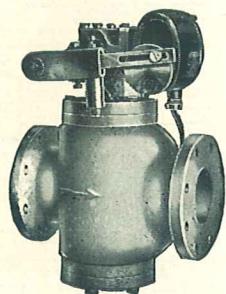
MOTORIZED COMBINATION GLOBE AND BUTTERFLY TYPE VALVES

For Controlling Simultaneously the Flow of Fuel (Oil or Gas) and Air, Maintaining a Constant
Fuel-Air Ratio

Globe and Butterfly valves used for this service are described above. The features of each valve, such as ease of adjustment, cleaning, etc., are retained when used in this combination.

For use with two-position, floating or proportioning industrial motors.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 8, Page 158. Prices Quoted on Request—State Proposed Applications.



MOTORIZED ROTARY STEM HIGH PRESSURE GLOBE VALVES

For Controlling the Flow of High Pressure Liquids and Gases, and for Pressure Reducing Service

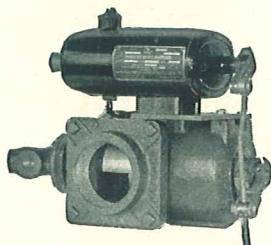
A semi-balanced double ported valve, available in sizes from $\frac{1}{2}$ " to 4" in the straight through, screwed pattern and $\frac{1}{2}$ " to 16" in the straight through, flanged pattern.

Cast iron or cast steel bodies with bronze, monel or stainless steel trim supplied as standard, depending on application.

Supplied for pressures up to 900 lbs./sq. in. at 750°F. and 1500-lbs./sq. in. at 100°F.

For use with any standard two-position, floating or proportioning industrial motor.

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 7, Page 151. Prices Quoted on Request—State Proposed Applications.



MOTORIZED ADJUSTABLE ORIFICE VALVES

For Controlling the Flow of Oil, Gas, and Air, Giving An Equal Percentage Change in Flow for Equal
Increments of Change in Valve Opening

Available in sizes $\frac{3}{8}$ " to $1\frac{1}{2}$ " for oil, $\frac{1}{2}$ " to 4" for gas, and $1\frac{1}{2}$ " to 10" for air.

Functions as an adjustable orifice regulated by the reaction of the controlling instrument in accordance with the process demands. The maximum orifice size can be adjusted in the field to meet individual operating conditions, without removing the valve from service.

USED EXTENSIVELY FOR CONTROLLING SIMULTANEOUSLY THE FLOW OF FUEL AND AIR MAINTAINING A CONSTANT FUEL-AIR RATIO RESULTING IN CONTROLLED COMBUSTION CHAMBER ATMOSPHERE. Combinations of oil-air and gas-air valves are obtained by mounting two valves in tandem, on a common shaft which is operated by one industrial motor. Both orifices are independently adjustable.

For use with any standard two-position, floating or proportioning industrial motor

For Complete Details refer to Minneapolis-Honeywell Catalog Sec. 7, Page 251. Prices Quoted on Request—State Proposed Applications.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Patent Notice

Minneapolis-Honeywell Controls, Time-O-Stat Controls and Con-Tac-Tor Mercury Switches are manufactured and sold under the following patents either owned by Minneapolis-Honeywell Regulator Company or under which Minneapolis-Honeywell Regulator Company is licensed. Other U. S. and foreign patents pending.

No. Re-16,087	No. 1,680,049	No. 1,785,741*	No. 1,875,510	No. 1,931,238	No. 2,022,188
Re-16,140	1,680,263	1,787,700	1,875,511	1,935,909	2,023,740
Re-16,444	1,680,348	1,791,589	1,875,569	1,937,746	2,023,748
Re-17,993	1,683,408	1,795,149	1,875,669	1,937,929	2,025,097
Re-18,361	1,690,881	1,796,286	1,876,044	1,937,968	2,025,264
Re-18,503	1,694,053	1,796,511	1,876,135	1,940,718	2,025,542
Re-18,771	1,694,107	1,796,544	1,877,037	1,941,502	2,028,110
Re-19,091	1,700,316	1,800,412	1,877,275	1,941,540	2,029,465
Re-19,235	1,703,534	1,805,277	1,877,327	1,941,546	2,029,513
1,325,896*	1,703,537	1,809,827	1,877,605	1,942,699	2,029,615
1,327,148	1,704,370	1,810,172	1,878,010	1,943,986	2,032,658
1,331,276	1,704,371	1,813,732*	1,879,154	1,946,598	2,036,868
1,335,539	1,707,193	1,816,881	1,880,524	1,946,903	2,038,067
1,355,041	1,707,194	1,818,546	1,880,829	1,951,663	2,039,910
1,377,874	1,707,195	1,818,697	1,880,830	1,953,425	2,041,050
1,390,987	1,707,459	1,820,300	1,880,831	1,953,923*	2,041,363
1,398,361	1,713,402	1,826,570	1,880,832	1,956,753	2,041,645
1,403,963	1,713,773	1,826,571	1,880,871	1,957,085	2,041,821
1,407,418	1,716,775	1,826,572	1,881,637	1,958,081	2,045,790
1,409,072	1,716,951	1,826,993	1,881,964	1,958,093	2,048,162
1,424,427	1,725,866	1,827,071	1,882,341	1,960,689	2,048,653
1,437,818	1,725,876	1,827,072	1,883,015	1,961,252	2,052,536
1,458,749	1,727,308	1,827,340	1,883,146	1,961,778	2,052,537
1,460,128	1,727,735	1,828,553	1,883,240	1,961,802	2,052,918
1,467,049*	1,730,828	1,831,845	1,883,241	1,962,506	2,052,929
1,484,156	1,730,829	1,832,462	1,883,242	1,962,620	2,052,947
1,491,156	1,730,830	1,835,307	1,883,243	1,963,957	2,052,987
1,493,739	1,730,831	1,835,974	1,883,244	1,966,106	2,054,331
1,496,596	1,732,174	1,838,152	1,883,245	1,968,385	2,054,368
1,501,943	1,734,017	1,839,630	1,883,246	1,969,136	2,055,033
1,533,630*	1,736,129	1,843,601	1,883,247	1,969,961	2,059,635
1,537,921	1,736,141	1,844,936	1,883,248	1,969,967	2,063,898
1,544,342	1,738,150	1,845,227	1,883,957	1,969,968	2,064,193
1,558,277	1,739,318	1,847,033	1,886,439	1,969,974	2,065,835
1,559,186	1,744,189	1,847,034	1,893,238	1,970,987	2,065,841
1,567,435	1,745,178	1,847,035	1,899,254	1,970,988	2,065,844
1,569,474	1,745,640	1,847,036	1,899,744	1,972,291	
1,571,401	1,747,153	1,847,037	1,901,070	1,973,620	
1,583,586	1,749,826	1,847,038	1,902,451	1,974,960	Des. 85,552
1,585,629	1,751,544	1,848,653	1,902,452	1,974,965	Des. 86,681
1,598,874	1,752,149	1,850,448	1,905,414	1,978,705	Des. 96,822
1,598,875	1,752,840	1,852,333	1,905,771	1,978,737	
1,598,876	1,758,146*	1,853,194	1,907,093	1,979,690	
1,598,877	1,758,147*	1,853,195	1,908,009	1,985,215	
1,599,173	1,760,382	1,853,196	1,908,493	1,985,216	
1,605,299	1,763,093	1,853,431	1,908,494	1,986,597	
1,607,392	1,763,094	1,854,207	1,910,721	1,988,809	
1,609,432	1,764,346	1,854,519	1,911,773	1,988,877	
1,614,563	1,765,056	1,854,540	1,912,791	1,989,278	
1,620,806	1,765,297	1,855,415	1,914,435	1,989,972	
1,622,112	1,768,805	1,855,741	1,916,814	1,990,216	
1,625,796	1,768,892	1,856,077	1,918,778	1,990,813	
1,627,690	1,768,940	1,856,586	1,918,794	1,991,691	
1,631,404	1,768,941	1,859,934	1,918,805	1,991,807	
1,651,629	1,768,943	1,861,046	1,920,757	1,993,262	
1,651,630	1,768,949	1,862,373	1,920,896	1,993,687	
1,652,524	1,770,479	1,862,393	1,921,196	1,997,559	
1,654,396	1,773,817	1,862,394	1,922,201	1,999,053	
1,654,840	1,774,108	1,865,641	1,923,254	2,000,700	
1,664,325	1,774,109	1,871,071	1,924,304	2,003,624	
1,665,801	1,774,275	1,872,147	1,924,906	2,008,749	
1,671,910	1,779,143	1,872,223	1,924,907	2,008,776	
1,673,057	1,780,302	1,872,880	1,924,925	2,013,266	
1,673,063	1,780,312	1,874,116	1,925,455	2,017,368	
1,675,131	1,780,313	1,874,117	1,925,781	2,019,671	
1,676,920	1,780,960	1,874,611	1,926,680	2,019,945	
1,676,922	1,782,530	1,875,387	1,927,036	2,020,168	
1,676,923	1,783,474	1,875,388	1,927,846	2,021,407	
1,678,202	1,783,730	1,875,509	1,929,606	2,021,413	

Canadian Patents

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297,015 (1930)
305,083 (1930)
305,601 (1930)
324,363 (1932)
324,364 (1932)
324,365 (1932)
330,554 (1933)
333,959 (1933)
336,159 (1933)
336,160 (1933)
353,590 (1935)
354,695 (1935)
357,965 (1936)

*The right to use the Systems protected by the following patents is only granted to the user by Minneapolis-Honeywell Regulator Company when the particular controls as shown below are purchased from Minneapolis-Honeywell Regulator Company and used in the Systems:

Patent No.	SYSTEM	CONTROLS
1,325,896 Safety Shut-off System.....	Any Automatic Valve	
1,467,049 Diaphragm Gas Valve System.....	Any Main Fuel Valve or Safety Pilot	
1,533,630 Summer-Winter Hot Water Control System.....	V261 Motorized Flow Valve, or M401 Circulator together with necessary check valves.	
1,758,146 System of maintaining Stoker Fire.....	"Stokerswitches" (Trade Mark)	
1,758,147 System of maintaining Stoker Fire.....	"Holdfire" Controls (Reg. U. S. Pat. Office)	
1,785,741 Forced Air Furnace Control System.....	Furnace Fan Controls	
1,813,732 Humidifying System	Humidity Responsive Controls	
1,953,923 Humidity Control Compensated by Outdoor Temperature Changes.....	T915-15 or T920-15 Remote Bulb Temperature Compensator	

A large, industrial valve with a handle and a flange, set against a dark background with the letters 'SIN' faintly visible in the upper left corner.

MINNEAPOLIS HONEYWELL

CONTROL SYSTEMS

BROWN INSTRUMENTS FOR INDICATING - RECORDING - CONTROLLING

heat up

**HOT WATER HEAT
WITH THE
Minneapolis-Honeywell
WATER
CIRCULATOR**

THE Minneapolis-Honeywell Water Circulator speeds up delivery of hot water to radiators so that the inherent lag of hot water heat is eliminated, thus providing almost instant heat from hot water systems. Circulation is stepped up to as high as 400 feet per minute and heat is distributed to sections ordinarily difficult to maintain at a comfortable temperature. It's quiet, spring mounted, Duprene cushioned capacitor motor is free from vibration and produces no radio interference, while its patented sealed oil reservoir containing no glands, packing or stuffing box, completely prevents leakage of oil or water. Only the Minneapolis-Honeywell Water Circulator provides these exclusive features. It is available for 1 inch, $1\frac{1}{2}$ inch, 2 inch, or 3 inch piping.

Dependable Controls Cost Less Than Service